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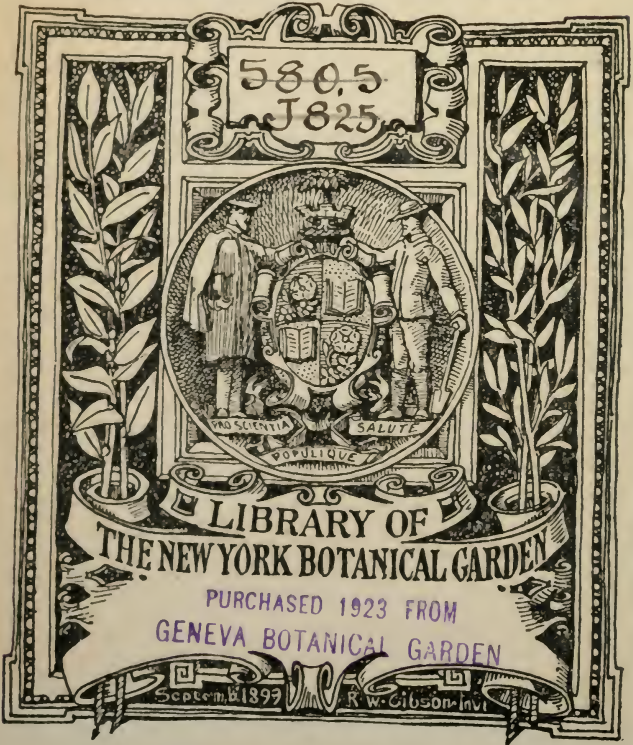
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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

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Eleonora Armitage.
Lilian Baker, M.Sc.
Arthur Bennett, A.L.S.
Spencer H. Bickham, F.L.S.
G. S. Boulger, F.L.S.
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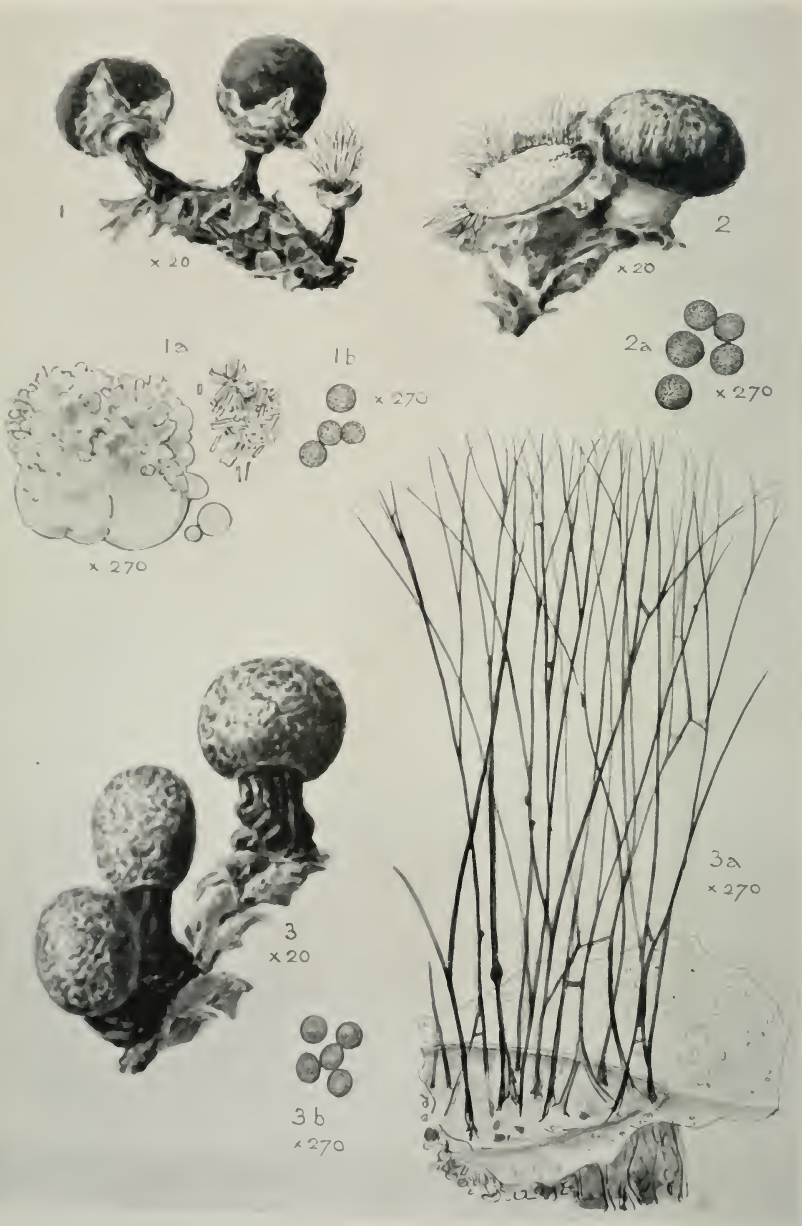
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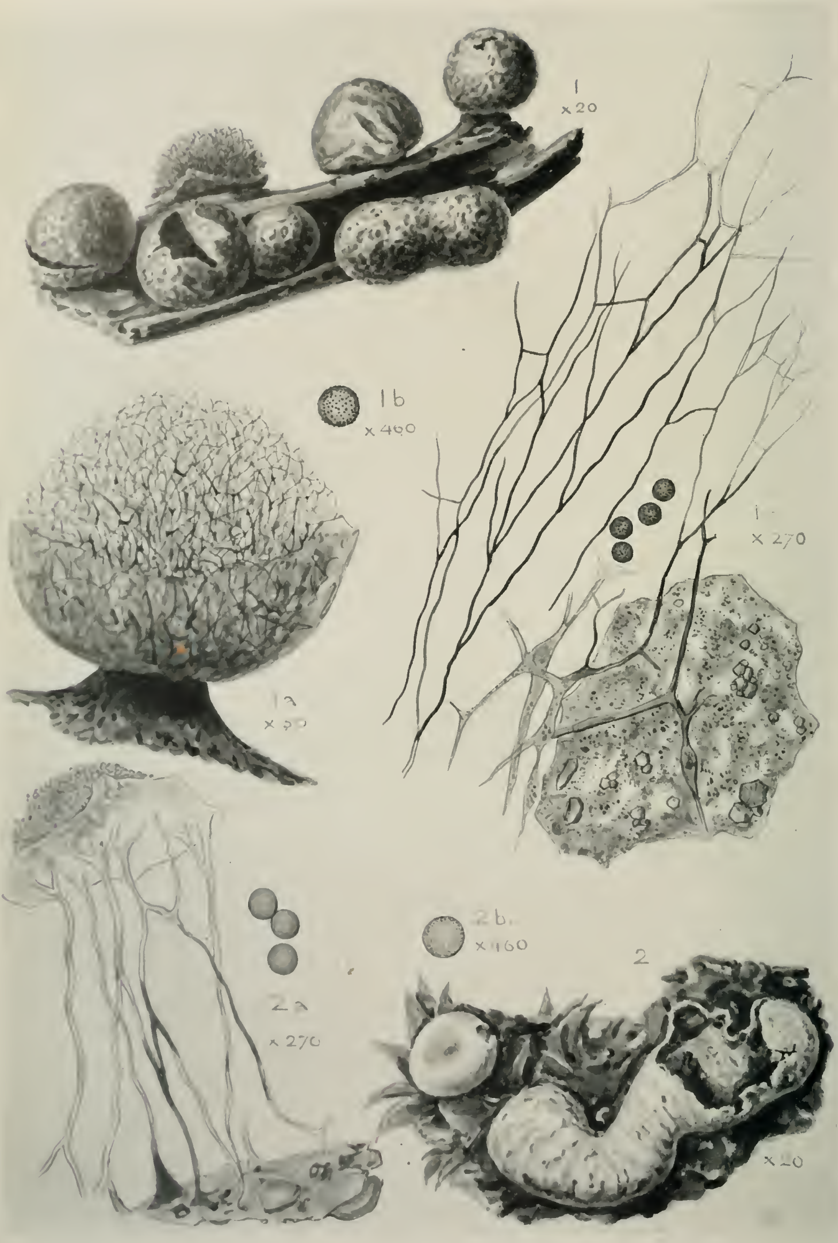
DIACHÆA CERIFERA *G. Lister.*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2, 2a, b. Diderma arboreum *G. Lister & Petch.*

THE

JOURNAL OF BOTANY

BRITISH AND FOREIGN.

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AUG 7 - 1923.

NEW MYCETOZOA.

By G. Lister, F.L.S.

(Plates 524, 525.)

Leptoderma, gen. n.

Sporangia sessile or shortly stalked; sporangium-wall membranous, hyaline in the upper part, in the lower part thickened with granular deposits, and sometimes including minute crystalline scales of carbonate of lime. Stalk black, enclosing refuse matter. Capillitium consisting of rigid, branched, and anastomosing black threads. Spores purplish-grey.

L. iridescens, sp. unica. Plasmodium drab-coloured. Sporangia scattered or in small clusters, globose or hemispherical, 0·5 to 0·8 mm. diam., sessile, rarely shortly stalked, greyish-purple or purplish-brown, glossy, iridescent, dehiscing irregularly; sporangium-wall nearly colourless in the upper part, thickened and veined below with embedded deposits of brown granules, sometimes including also scattered crystalline scales of lime from 2 to 15 μ diam. Stalk very short, stout, appearing nearly black from the dark refuse matter enclosed by its pale walls, spreading below into a membranous hypothallus which is also charged with refuse matter. Columella none. Capillitium consisting of a persistent network of slender black threads, colourless at the extremities, radiating from the floor of the sporangium; the pale bases of the threads are often tubular and expanded, enclosing granular matter. Spores purplish-grey, spinulose, 10 to 11 μ diam.

Habitat. On pine-bark, twigs, leaves, &c.

This genus appears to be allied to *Lamproderma*, from which it differs in the thickened sporangium-wall, and the occasional presence there of deposits of carbonate of lime; also in the stalk enclosing refuse matter. It is more nearly allied to *Lepidoderma*, from which it is distinguished by the sporangium-wall being membranous, not cartilaginous, and from the deposits of lime being very scanty or absent.

I first found the dusky little sporangia in March, 1892, and again in December, 1894, in fir plantations at Leighton Buzzard, Bedfordshire, where they appeared on pine bark and dead leaves. The gatherings were small, and my father and I thought they might be considered an irregular sessile form of *Lamproderma columbinum* (see Brit. Mus. Cat. ed. 1, p. 126, and ed. 2, fig. 131 *h*). In November, 1911, Miss Katherine Higgins found abundant sporangia on leaves and twigs amongst the lower parts of whortleberry bushes at Woburn Sands, Beds; they were both in mature condition, and arising from dirty-looking drab plasmodium. Last September, Miss Hibbert-Ware and I obtained the same form in moist spruce woods near Mürren, Switzerland, and also in the ancient pine forest of Rothiemurchas, in the north of Scotland. I have since received it from M. Ch. Meylan, who gathered it in woods near La Vaux, in the Jura Mountains, about 4000 ft. alt., not far from Neuchatel, in October last. All the specimens show the same features, except that the minute crystalline scales of lime are present in the walls of some sporangia and absent from others.

Diderma arboreum G. Lister & Petch, sp. n. Plasmodium? Sporangia scattered, discoid or saucer-shaped, 0·5 mm. diam., sessile or shortly stalked, or forming irregularly expanded flattened plasmodiocarps 1 to 3 mm. diam., white, or purplish-grey when lime-deposits are scanty, smooth or wrinkled; sporangium-wall fragile, colourless, pale purplish or brownish, usually invested with an outer crust of minute round lime granules; these, however, may be absent, or represented by scattered irregular fragments of lime. Stalk pale reddish-brown or nearly black, rugose, stout or slender, 0·1 mm. high. Columella convex and flesh-coloured, or absent. Capillitium consisting of simple or branched, colourless or purplish threads, 1·5 to 3 μ diam., often anastomosing and showing irregular expansions near the extremities. Spores 10 to 15 μ diam., pale purplish or purplish-brown, minutely spinulose.

Habitat. On moss, lichens, and bark, on the trunks of living trees.

This species is allied to *D. effusum* Morgan, from which it differs in the stouter capillitium, the larger spores, and in the sporangia being sometimes stalked. It has been obtained from three widely separated regions—Ceylon, Japan, and Scotland. It was first found in May, 1906, by Mr. T. Petch in Ceylon, at Peradeniya, 1600 ft. alt., and at Talawakelle, 4000 ft. alt.; and again at Peradeniya in August, 1906. On first sending a specimen to my father, Mr. Petch suggested that the specific name "*arboreum*" might be appropriate, from the arboreal habit of the sporangia; we, however, were then inclined to regard it as a sessile form of *Diderma rugosum*, under which name Mr. Petch refers to it in the *Annals of the Royal Botanic Gardens, Peradeniya*, iv. 345 (1910).

In Japan, Mr. Kumagusu Minakata obtained similar sporangia in the summers of 1906, 1907, and 1909, in the province of Kii, on the living trunks of *Prunus Mume* Sieb. & Zucc., *P. persica* Sieb. & Zucc., and *Celtis sinensis* Pers. These Japanese gatherings were puzzling, as the lime deposits were scanty and in the form of irregular granules and scales, showing little of the bead-like granules characteristic of *Diderma*; the capillitium also was either scanty or irregularly developed, with many swellings and knob-like projections.

In Scotland, thanks to the keen sight and perseverance of the Rev. W. Cran, many gatherings have been made in summer and autumn in the last three years on the living trunks of elder, sycamore, &c., both at Rhynie and Skene, Aberdeenshire. The sporangia are usually very inconspicuous objects, scattered amongst moss-tufts four or five feet from the ground on exposed trees. Although they vary much in size, shape, and the abundance of lime deposits, these numerous gatherings satisfactorily establish the constancy of the chief characters of the species.

Diachæa cerifera, sp. n. Plasmodium colourless. Sporangia scattered or in small clusters of two or three, stalked, subglobose or ellipsoid, 0·7 to 1·2 mm. diam., brownish-purple, shining with iridescent reflections; sporangium-wall somewhat persistent, membranous, hyaline or with a yellowish tinge at the base. Stalk brownish-black and furrowed, yellowish-brown or nearly white, 0·2 to 0·6 mm. high, 0·15 to 0·5 mm. thick; when black it may be provided at the apex with a thick yellow collar on which the sporangium rests. Columella none, or represented by the flattened summit of the stalk. Capillitium consisting of rigid, nearly black threads, pale at the extremities, 1·5 to 3 μ diam., more or less branched and anastomosing, radiating from the apex of the stalk. Spores purplish-grey, pale or dark, minutely spinulose, 10 to 18 μ diam.

Habitat. On moss and liverworts on dead wood. Norway, Jura Mountains, Japan.

We have three gatherings of this species. It was found first by the late Prof. Axel Blytt near Christiania, Norway, in September, 1879. A small specimen was sent to my father for determination. The nearly sessile sporangia were associated with those of *Lamproderma columbinum* Rost., and in the *British Museum Catalogue* the gathering is referred to as a sessile form of that species. It is described there in the following terms: "The globose sporangia are each seated on a yellowish horny cushion of dried plasmodium; there is no stalk or columella: the capillitium rises from the broad base of the sporangium, and is more rigid than in the stalked form of *L. columbinum*; the spores measure 16 to 19 μ." (The capillitium is illustrated in Brit. Mus. Cat. ed. 2, by fig. 131*i*.)

The second gathering was made by M. Ch. Meylan on the Chasseron, in the Jura Mountains, at an altitude of over 4000 ft., in July, 1910. He kindly sent me a group of five or six sporangia. They are subglobose or ellipsoid in shape, on stout brownish-black glossy stalks. M. Meylan writes that the plasmodium was white, and the stalks when first formed were yellow, becoming brown on drying; and that they were still pale when the sporangia had turned black. The spores are paler than in the Norwegian gathering, and measure 11 to 13 μ. In water mountings, when examined under the microscope with transmitted light, these stalks are seen to have translucent yellowish-brown walls, and to enclose refuse matter. When subjected to moderate heat and pressure, yellow oily-looking drops exude from their upper parts. Similar drops also appeared when heat and pressure were applied to the "horny bases" of Blytt's sporangia.

For the third gathering we are indebted to Mr. K. Minakata, who found it on Ando Mountain, in the province of Kii, Japan, in November, 1910. It consists of about thirty somewhat weathered and mouldy sporangia on cylindrical blackish stalks. Each stalk is surmounted by a thick yellow ring or collar, from whose margin the sporangium-wall arises. The capillitium is attached to the apex of the stalk within the collar. The spores are pale purplish, 10 to 13 μ diam. The collars, which are sometimes irregular and incomplete, consist of flakes and spicules of a wax-like substance that melts into drops on application of heat. By the advice of Prof. Cavers, I treated these drops with tincture of alkannin, a dye that stains wax, but does not affect oil; from the deep crimson colour that the drops instantly took, it seems clear that they consist of wax. I think it is also most probable that the yellow exudations in the stalks of the Swiss and Norwegian specimens also consist of wax, but the material is too scanty to experiment with.

This remarkable species appears to have no very close allies. Perhaps it most nearly resembles the form of *Diachæa subsessilis* Peck in which the dark stalk is without lime deposits. It differs from all species of *Diachæa* in the absence of a columella, and appears so far to be unique among the Mycetozoa in containing deposits of wax in the stalk.

Explanation of Plates.

Tab. 524.—Fig. 1. *Leptoderma iridescens*, a group of sporangia. 1*a*. Sporangium with a short stalk; the upper part of the wall has fallen away, exposing the network of capillitium; the spores are dispersed. 1*b*. Spore, highly magnified. 1*c*. Capillitium threads from the upper and lower parts of the sporangium, and spores; also a fragment of the sporangium-wall from near the base showing deposits of granules and embedded scales of carbonate of lime. 2. *Diderma arboreum*. Two sporangia, one discoid, the other forming a winding plasmodiocarp; the walls of the latter are broken, exposing the columella. 2*a*. Capillitium threads attached above and below to the sporangium-walls, and three spores. 2*b*. Spore highly magnified.

Tab. 525.—*Diachæa cerifera*. 1. Sporangia, from Japan, showing the collar at the base of the sporangium 1*a*. To the right, spicules and flakes of wax from the collar; to the left, the same flakes running into globules after application of heat and pressure. 1*b*. Spores from Japanese sporangia. 2. Two sporangia with confluent stalks from Norwegian gathering; in the left sporangium the capillitium and spores are to a great extent dispersed, and the broad summit of the stalk is exposed. 2*a*. Spores from these sporangia. 3. Three sporangia from the Jura Mountains. 3*a*. Capillitium threads from the same, showing attachment below to the apex of the stalk. 3*b*. Spores from the same.

NOTES ON THE FLORA OF DERBYSHIRE.—III.*

By E. & H. Drabble.

The summers of 1911 and 1912 have been very unsatisfactory for flowering plants, the former having been too dry and the latter too wet. Nevertheless much time has been spent in field-work, and some attention has been given to the Hepatics, a class which seems to have attracted but little notice in the county since the death of the Rev. W. R. Linton. How extraordinarily careful Mr. Linton's work was can only be appreciated fully by actual workers in Derbyshire.

In the following list new county records are marked with a dagger; new records for the geological divisions are starred. We acknowledge with gratitude our indebtedness to the Rev. W. L. Coleman for several interesting notes, and to Mr. S. Steele, the Secretary of the East Derbyshire Field Club, for a list of plants found by members of the Club.

Ranunculus peltatus Schrank var. *floribundus* (Bab.). (*Y) Eagle Tor.—*R. sceleratus* L. (P) Markland Grips. This plant is strangely local in the county, particularly in the north.

Berberis vulgaris L. (*G) Birchover; (*L) Ashover; very rare in the county.

Chelidonium majus L. (C) Ashgate; (G) Birchover; (*Y) Matlock.

Barbarea vulgaris Ait. (G) Stanton Lees.—*Hesperis matronalis* L. (C) Holymoorside. — *Sisymbrium Thalianum* L. (L) Castleton, Middleton Dale; this plant is common in the rocky dales on the Carboniferous Limestone. We have not met with it on the Permian Limestone.—*S. pannonicum* Jacq. (Y) First seen at Rowsley in 1909; it still persists as a roadside alien.—*Raphanus Raphanistrum* L. (L) Breton.

Viola Deseglisei Jord. (G) Stanton Lees.—*V. agrestis* Jord. (*P) Creswell; (C) Old Brampton; (G) Lumsdale. — *V. obtusifolia* Jord. (*P) Clowne.—*V. lutea* Huds. (G) Birchover.

Silene latifolia Rendle & Britten var. *puberula* Jord. (C) Ashgate. — *Arenaria serpyllifolia* L. var. *viscidula* Roth. (P) Markland Grips. — *Sagina ciliata* Fr. (G) Birchover. — *Spergula arvensis* L. (G) Stanton Lees. — *S. sativa* Boenn. (G) Stanton Lees.

Tilia cordata Mill. (C) Ogston Park.

Linum catharticum L. (Y) Eagle Tor.

Geranium pratense L. (G) Birchover; (Y) below Winster, abundant; (L) Grange Mill, Elton. — *G. lucidum* L. (*Y) This characteristically limestone plant occurs on the Yoredale shales near Eagle Tor.—*G. Robertianum* L. (L) Many plants with white flowers near Elton.

Genista tinctoria L. (G) Birchover. — *Medicago lupulina* L. var. †*Willdenoviana* Koch. (*P) Clowne.

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* See Journ. Bot. 1909, pp. 199–207; 1911, pp. 313–317.

Spiræa Ulmaria L. (*Y) Eagle Tor.—*Agrimonia Eupatoria* L. var. †*sepium* Bréb. (*Y) Near Birchover. — *Pyrus Aria* Ehrh. (G) Above Tansley. — *Cratægus monogyna* Jacq. var. *laciniata* Wallr. (*G) Stanton Lees.

Parnassia palustris L. (L) Grange Mill.

Hippuris vulgaris L. (P) Markland Grips.

Epilobium angustifolium L. var. †*brachycarpum* (Leight). (*Y) Stanton. Most of the plants in the neighbourhood are true *E. angustifolium* L.—*E. parviflorum* Schreb. (G) Stanton Moor. This plant is rare on the Grit, but is the commonest *Epilobium* on the Limestone.—*E. montanum* L. is the commonest *Epilobium* on Yoredales and the Grit. Near Winster and Birchover, where all three formations occur quite near to one another, this distribution is very well marked.—*E. roseum* Schreb. (G) Tansley and near Nether Loads.—*Circæa alpina* L. (*Y) Near Wensley.

Pimpinella Saxifraga L. (*Y) Darley. — *P. major* Huds. var. *dissecta* Druce. (G) Near Milltown. — *Silaus flavescens* Bernh. (L) Bakewell, Winster.—*Angelica sylvestris* L. (Y) Whatstandwell. — *Heracleum Sphondylium* L. var. *angustifolium* Huds. (G) Birchover; (*Y) Whatstandwell.

Cornus sanguinea L. (P) Markland Grips.

Galium verum L. var. †*maritimum* DC. (L) Plants exactly resembling the maritime sand-dune form occur on the dry limestone hillsides near Winster; they pass into the ordinary form, just as they do by the sea, and are hardly worth distinguishing as a variety.

Dipsacus pilosus L. (L) Mill Close. — *Scabiosa succisa* L. (L) Pindale.

Eupatorium cannabinum L. (Y) Rowsley, Whatstandwell. This is characteristically a limestone plant in North Derbyshire; it is carried on to the Yoredale by the streams and rivers, but rapidly becomes less frequent further from the Limestone. The localities on G given in Mr. Linton's *Flora* are mostly on the Yoredale; if it occurs on the Grit at all it must be very rarely; we have never met with it there. — *Solidago Virgaurea* L. var. *cambrica* Huds. (*G) Birchover.—*Bidens tripartita* L. (*Y) Whatstandwell.—*Tanacetum vulgare* L. (*Y) Whatstandwell, Matlock. —*Carduus crispus* L. (Y) Whatstandwell. — *Serratula tinctoria* L. (C) Holymoorside.—*Hieracium boreale* Fr. (*Y) Whatstandwell. — *Lactuca muralis* L. (G) Tansley; frequently with the upper leaves 2–3 in. long, entire, oblong-lanceolate, obtuse. We have not met with this peculiar state elsewhere.—†*Tragopogon pratense* L. (*eu-pratense*). (*L) Monsal Dale. At Boythorpe (C) and at Creswell (P) plants were found with the flowers as long as the involucral bracts, but with brown anthers. In Babington's *Manual*, ed. ix., *T. pratense* L. is described as having "inv. equalling or shorter than the flowers" and yellow anthers; *T. minus* Mill as having "inv. about twice as long as the flowers" and dark brown anthers. Our plants have brown anthers and involucral bracts as long as the flowers. They seem to agree fairly well with *T. Lamottei* Rouy in Bull. Soc. Bot. Fr. 28, p. liv. (see

Rouy's Fl. de Fr. t. x. p. 2). Rouy makes no mention of any yellow-anthered form in the Fl. de Fr. Unfortunately ripe fruits were not found. We hope to be able to collect more satisfactory material next year.

Primula veris × *vulgaris*. (*P) Scarcliffe Park (*E. D. Field Club*).

Vinca major L. (*P) Well established at Creswell Crags.

Blackstonia perfoliata Huds. (P) Near Bolsover (*J. Howell*). This plant is nearly or quite confined to the Permian Limestone, where it is rare. The only locality for which it is recorded away from the Permian is Matlock; this record occurs in a MS. list drawn up by Mrs. T. M. Stevens in 1864 (see Linton's *Flora*, pp. 37 and 213). We have never seen it at Matlock or anywhere else on the Carboniferous Limestone.

†*Symphytum tuberosum* L. (*L) Crich.—*Echium vulgare* L. (C) Barlow (*E. D. Field Club*), Handley (*Rev. W. L. Coleman*). These records are of considerable interest; the plant has only been recorded twice previously from the Coal Measures, namely, by Glover in 1829, and by Crewe and Whittaker in 1864. We have no doubt that these plants in each case had been brought in some way from the Permian, where the plant occurs as a native, though not frequently.

Hyoscyamus niger L. (C) Handley (*Rev. W. L. Coleman*). This plant is very rare in the county. The only previous record for the Coal Measures is in Pilkington's "Derbyshire," 1789.

Verbascum Thapsus L. (G) Birchover.—*Mimulus Langsdorfii* Donn var. †*guttatus* DC. (*Y) Eagle Tor, with yellow flowers marked with brown. Mr. Marshall has an interesting note on this name in Rep. Bot. Exch. Club, 1911, part ii. p. 109. The plant previously recorded by us from Langwith (Journ. Bot. 1908, p. 205) was the ordinary yellow-flowered plant.—*Euphrasia Rostkoviana* Hayne. (G) Stanton Lees, Cratcliffe Rocks; (L) Winster.—*E. campestris* Jord. (L) Mill Close.—*E. Kerneri* Wettst. (L) Mill Close.—*E. borealis* Towns. (L) Winster.—*Melampyrum pratense* L. var. *montanum* Johnst. (G) Birchover.—*Lathræa Squamaria* L. (C) Eckington (*E. D. Field Club*).

Verbena officinalis L. (*C) Handley (*Rev. W. L. Coleman*). This plant is extremely rare in the county.

Mentha piperita L. (L) Grange Mill.—*M. alopecuroides* Hull. (*Y) Whatstandwell.—*Lycopus europæus* L. (*Y) Whatstandwell.—*Scutellaria galericulata* L. (Y) Whatstandwell.—*Stachys palustris* L. (*Y) Whatstandwell.—*Galeopsis Ladanum* L. (P) Clowne; there is only one previous record for the county.

Chenopodium album L. var. *paganum* (Reichb.). (P) Clowne.

Polygonum amphibium L. (*Y) Whatstandwell, Rowsley.—*P. Bistorta* L. (*Y) Matlock.—*Rumex domesticus* Hartm. (G) Birchover; (L) Winster.

Daphne Laureola L. (P) Markland Grips (*E. D. Field Club*).

Euphorbia exigua L. var. *retusa* L. (C) Old Brampton.

Urtica dioica L. var. *angustifolia* W. & G. (*P) Creswell Crags.

Betula tomentosa Reith. & Abel. (G) Cathole.—*Carpinus Betulus* L. (C) Tapton; very uncommon in the district.

Castanea sativa Mill. (P) Creswell; (G) Stanton, Cratcliffe Rocks.

Populus tremula L. (C) Claycross.

Empetrum nigrum L. (G) Cathole.

Helleborine latifolia Druce. (*Y) Wensley.—*Ophrys apifera* Huds. (P) Bolsover Moor Quarry (*J. Howell*), Markland Grips (*E. D. Field Club*).—*O. muscifera* Huds. (P) Scarcliffe (*Rev. J. Mullins*).—*Habenaria viridis* Br. (L) Eyam, Over Haddon.

Alisma lanceolatum With. (*Y) Whatstandwell.

Catabrosa aquatica Beauv. (L) Winster.—*Festuca elatior* L. (Y) Wensley.—*Agropyron caninum* Beauv. (P) Markland Grips.

Ophioglossum vulgatum L. (L) Grange Mill.

Equisetum limosum Sm. (G) Stanage; (*Y) Eagle Tor.

HEPATICÆ.

The list of Hepatics given in the *Flora* bears witness to the well-known thoroughness of Mr. Linton's work. His general remarks on distribution are fully confirmed by our observations. The Millstone Grit and the grits of the Yoredale Series are by far the most productive in Hepatics.

Of the fourteen species and varieties mentioned by Mr. Linton as found on the Limestone alone, only one has been found elsewhere by us—on the Coal Measures and the Grit. Of the twenty-eight given in the *Flora* for Grit alone we have found one on the Permian, two on the Coal Measures, one on the Carboniferous Limestone, and four on the Yoredales. It must be remembered, however, that Mr. Linton included some Yoredale districts under (L) and others under (G).

A noticeable feature of the Hepatics during the wet summer of 1912 was the green colour of the plants of many species which are usually red or purple.

RICCIACEÆ.

Riccia glauca L. (L) Lathkil Dale.

MARCHANTIACEÆ.

Reboulia hemisphærica (L.) Raddi. (P) Creswell (*W. R. L.*); (L) Bradwell (*W. R. L.*), Eyam, Via Gellia.

Conocephalum conicum (L.) Dum. (C) Tapton, Walton, Wooley Moor, Ogston; (G) Cathole; (*Y) Darley, Whatstandwell, Matlock; (L) Castleton.

Lunularia cruciata (L.) Dum. (*C) Wooley, Somersal, Nether Loads, Holymoorside; (G) Birchover; (*Y) Elton, Wensley, Eagle Tor, Lumsdale; (L) Winster, Eyam.

Preissia quadrata (Scop.) Nees. (L) Monsal Dale.

Marchantia polymorpha L. (*C) Spital, Stretton, Newbold, Nether Loads; (*Y) Elton, Wensley; (L) Castleton, Eyam.

JUNGERMANNIACEÆ ANACROGYNÆ.

Aneura pinguis (L.) Dum. (C) Linacre, Lower Hady; (G) William Clough (*W. R. L.*), Hayfield (*W. R. L.*), Stanton Lees; (*Y) Whatstandwell.—Var. †*angustior* Hook. (*G) Cathole.—*A. multifida* (L.) Dum. (*Y) Edale, Back Tor.—Var. *ambrosioides* Nees. (*Y) Back Tor.—*A. sinuata* (Dicks.) Dum. (*C) Linacre Wood; (G) Cathole.—†*A. major* (Lindb.) K. Müll. (*C) Spital, Sutton, Lower Hady.

Metzgeria furcata (L.) Dum. (G) Hipper Sick.

Pellia epiphylla (L.) Corda. (*P) Markland Grips; (*C) Tapton, Walton, Linacre, Holymoorside; (G) Tansley, Hipper Sick, Cathole; (*Y) Clough Wood, Hollins.—*P. Neesiana* (Gottsche) Limpr. (*P) Markland Grips; (*C) Holymoorside; (G) Stanton Lees, Hipper Sick, Cathole; (*Y) Clough Wood, Back Tor, Whatstandwell.—Var. †*undulata* Jack. (*Y) Eagle Tor, Back Tor.—*P. Fabbroniana* Raddi. (G) Birchover, Hipper Sick; (*Y) Clough Wood, Eagle Tor, Back Tor, Whatstandwell; (L) Winster, Aldwark.—Var. †*lorea* Nees. (*G) Hipper Sick.

Fossombronia pusilla (L.) Dum. (C) Lower Hady; (*Y) Clough Wood.—†*F. Wondraczeki* (Corda) Dum. (*C) Sutton Wood.—†*F. cæspitiformis* De Not. (*C) Lower Hady.

JUNGERMANNIACEÆ ACROGYNÆ.

Alicularia scalaris (Schrad.) Corda. (G) Hipper Sick.—Var. †*procerior* Schiffn. (*Y) Back Tor.—Var. †*distans* Carr. (*Y) Back Tor.

Aplozia crenulata (Sm.) Dum. (G) Hipper Sick; (Y) Hollins, Chapel-en-le-Frith (*W. R. L.*), Edale (*W. R. L.*).—Var. *gracillima* (Sm.) Heeg. (G) Tansley; (L) Castleton.—*A. sphærocarpa* (Hook.) Dum. (*C) Linacre Wood.—*A. riparia* (Tayl.) Dum. (*Y) Whatstandwell.—*A. atrovirens* (Schleich.) Dum. (L) Miller's Dale (*W. R. L.*)—*A. pumila* (With.) Dum. (G) Cathole; (*Y) Clough Wood; (L) Castleton.

Gymnocolea inflata (Huds.) Dum. (G) Hipper Sick, Cathole.

Lophozia turbinata (Raddi) Steph. (*C) Lower Hady; (*G) Hipper Sick, Cathole.—†*L. badensis* (Gottsche) Schiffn. (*G) Birchover.—*L. ventricosa* (Dicks.) Dum. (G) Cathole, Tansley.—*L. porphyroleuca* (Nees) Schiffn. (*G) Stanton Lees.—†*L. bicrenata* (Schmid.) Dum. (*Y) Back Tor.—*L. excisa* (Dicks.) Dum. (*Y) Whatstandwell, Back Tor.—*L. incisa* (Schrad.) Dum. (G) Stanton Moor.—*L. Floerkii* (Web. et Mohr.) Schiffn. (G) Birchover, Hipper Sick.—Var. †*Naumanniana* Nees. (*G) Birchover; (*Y) Back Tor.—†*L. atlantica* (Kaal.) Schiffn. (*G) Hipper Sick; (*L) Winster.—*L. barbata* (Schmid.) Dum. (G) Birchover.

Sphenolobus exsectiformis (Breidl.) Steph. (G) Froggatt (*W. R. L.*), Little Eaton (*W. R. L.*); (Y) Whatstandwell (*W. R. L.*).

Plagiochila asplenioides (L.) Dum. (L) Castleton, Winster.—Var. *minor* Lindenb. (*P) Markland Grips; (G) Tansley; (*Y) Eagle Tor; (L) Winster, Castleton.—Var. *humilis* Lindenb. (L) Miller's Dale (*S. J. O.*).—Var. †*major* Nees. (*G) Stanton

Lees. — Forma †*subintegerrima* Schiffn. (*G) Cathole; (*Y) Clough Wood.

Pedinophyllum interruptum (Nees) Pears. (L) Castleton.

Leptoscyphus anomalus (Hook.) Mill. (*L) Winster.

Lophocolea bidentata (L.) Dum. (*C) Tapton, Lower Hady, Walton Wood, Sutton, Wooley, Linacre, Holymoorside; (G) Stanton Lees, Birchover, Hipper Sick; (*Y) Elton, Clough Wood; (L) Grange Mill, Matlock, Winster, Castleton. —Forma †*latifolia* (Nees). (*G) Cathole. — *L. cuspidata* Limpr. (P) Creswell; (C) Sutton, Wooley, Linacre, Holymoorside, Lower Hady, Tapton; (G) Ashover Hay, Birchover, Stanton Moor, Cathole; (*Y) Clough Wood, Darley, Eagle Tor, Lumsdale, Hollins, Wensley, Whatstandwell, Black Tor; (L) Matlock, Fallgate, Aldwark, Castleton. —†*L. alata* Mitt. ex Larter. (*C) Lower Hady; (*G) Birchover, Stanton Lees, Hipper Sick; (*Y) Eagle Tor, Lumsdale; (*L) Matlock, Aldwark. — *L. heterophylla* (Schrad.) Dum. (C) Walton Wood, Brackenfield, Ogston, Wooley, Linacre, Lower Hady; (G) Stanton Moor, Stanton Lees, Tansley; (*Y) Clough Wood, Eagle Tor, Darley, Wensley, Whatstandwell; (L) Castleton, Winster.—*L. fragans* Moris et De Not. (G) Stanton Lees, Tansley.—

Chiloscyphus polyanthos (L.) Corda var. *rivularis* (Schrad.) Nees. (G) Cathole.—Var. †*fragilis* (Roth) K. Müll. (*G) Cathole. — †*C. pallescens* (Ehrh.) Dum. (*C) Walton Wood; (*G) Cathole.

Cephalozia bicuspidata (L.) Dum. (G) Birchover, Hipper Sick; (*Y) Back Tor, Hollins.—*C. Lammersiana* (Hüb.) Spruce. (*C) Brackenfield; (G) Stanton Moor, Stanton Lees, Tansley, Hipper Sick, Cathole; (*Y) Clough Wood, Back Tor. — Var. †*serratiflora* Schiffn. (*G) Stanton Lees.—†*C. connivens* (Dicks.) Lindb. (*C) Walton Wood; (*G) Birchover, Hipper Sick. — †*C. macrostachya* Kaal. (*G) Hipper Sick; (*Y) Back Tor.— †*C. leucantha* Spruce. (*G) Stanton Moor.

†*Cephaloziella byssacea* (Roth) Warnst. (*C) Wooley, Lower Hady. — †*C. bifida* (Schreb.) Schiffn. (*C) Lower Hady; (*Y) Back Tor.—†*C. Limprichtii* Warnst. (*Y) Back Tor.

Calypogeia Trichomanis (L.) Corda. (G) Cathole, Hipper Sick, Stanton Lees, Stanton Moor, Birchover; (*Y) Back Tor.— Var. †*aquatica* Ingham. (*Y) Back Tor.—†*C. Neesiana* (Carest. et Massal.) Massal. (*G) Hipper Sick, Stanton Lees, Stanton Moor, Birchover.—*C. fissa* (L.) Raddi. (G) Ashover Hay, Stanton Lees, Stanton Moor, Tansley; (*Y) Back Tor.

Bazzania trilobata (L.) Gray. (G) Birchover.

Lepidozia reptans (L.) Dum. (C) Walton Wood; (G) Birchover, Stanton Moor.—Var. †*tenera* (Huben.) Nees. (*C) Walton Wood; (*G) Hipper Sick, Stanton Moor, Birchover; (*Y) Back Tor.—Var. †*julacea* Nees. (*G) Birchover; (*Y) Whatstandwell. —*L. Pearsoni* Spruce. (G) Hipper Sick, Stanton Moor, Birchover; (*Y) Back Tor.

Ptilidium ciliare (L.) Hampe. (G) Birchover, Stanton Moor; (*Y) Back Tor. — *P. pulcherrimum* (Web.) Hampe. (*G) Birchover, Stanton Moor.

Diplophyllum albicans (L.) Dum. (C) Brackenfield; (G) Ashover Hay, Stanton Moor, Stanton Lees, Birchover, Tansley, Hipper Sick; (*Y) Clough Wood, Back Tor, Hollins.

Scapania aspera Bernet. (G) Cathole; (L) Miller's Dale (*S. J. O.*) — *S. nemorosa* (L.) Dum. (G) Cathole. — *S. dentata* Dum. (*C) Walton Wood, Holymoorside; (*G) Cathole, Hipper Sick, Tansley; (*Y) Clough Wood, Darley, Back Tor. — Var. †*ambigua* De Not. (*C) Walton Wood, Holymoorside, Nether Loads.—*S. intermedia* (Husnot) Pears. (G) Tansley, Birchover; (*Y) Clough Wood. — *S. undulata* (L.) Dum. (G) Cathole.—*S. irrigua* (Nees) Dum. (G) Hipper Sick, Birchover, Brown Edge (*W. R. L.*); (*Y) Back Tor; (L) Buxton (*W. R. L.*) — *S. curta* (Mart.) Dum. (G) Stanton Lees; (*Y) Back Tor.

Radula complanata (L.) Dum. (*Y) Wensley.

Madotheca platyphylla (L.) Dum. (*G) Ashover Hay, Birchover; (*Y) Wensley; (L) Winster, Fellgate, Matlock, Grange Mill. —†*M. rivularis* Nees. (*L) Castleton.

In this list are included the few records for Derbyshire published in the Moss Exchange Club Reports since 1902. We desire to express our thanks to Mr. Ingham for the loan of these Reports. Our indebtedness to Mr. Symers Macvicar's excellent *Handbook of British Hepatics* is too great for adequate acknowledgment.

THE GENUS *FLAGENIUM*.

By H. F. Wernham, B.Sc.

Botanical Department, Natural History Museum.

In the course of researches into the Rubiaceous genus *Sabicea* my attention has been called to the very similar genus *Flagenium*. The chief distinction from *Sabicea* lies in the æstivation of the corolla-lobes; this is valvate in *Sabicea* and closely contorted in *Flagenium*, so that the latter is included in the tribe Gardenieæ, in contrast with the former, a member of the Mussændeæ. The ovary in *Flagenium* is, moreover, bilocular—a rare feature in *Sabicea*, and the subulate-acuminate stipules of the known species of *Flagenium* are unparallelled in *Sabicea*. So far as is known at present, the latter is confined to Madagascar.

The genus was established by Baillon (Bull. Soc. Linn. Paris, i. 216) on *Triosteum triflorum* Vahl, Symb. iii. 37 (= *Sabicea? triflora* DC. Prod. iv. 439). This is admirably figured by Drake in Grandidier's Hist. Phys. Nat. Pol. Madagascar, xxxvi. vi. t. 446. It is probable that *Sabicea setosa* Richard, in Mem. Soc. Hist. Nat. Par. v. 228 (1829), belongs to the same genus; the description is unfortunately too scanty for definite decision in the matter; but the words "corolla brevissima; antheris linearibus exsertis" seem, at any rate, to exclude this plant from the genus *Sabicea*.

Apart from this doubtful form, the genus appears to comprise three distinct species, as follow:—

1. Flagenium triflorum Baillon, Hist. Pl. vii. 444 (1880). A shrub 7–8 ft. high, with virgate branches and oblong-lanceolate leaves.

Hab. Madagascar, *Goudot*! in Hb. Mus. Brit.

The leaves reach 10 cm. in length and over 3 cm. in width, with stalk 5 mm. long; the subulate-acuminate stipules are 8–9 mm. in length. The cymes are subsessile, and the corolla-lobes narrow triangular acuminate and very acute. The calyx-lobes are barely 1 cm. long, and subulate-setaceous, erect, tending to curl at maturity, and the calyx-tube is manifest, 3 mm. long in the fruit.

2. **Flagenium arboreum**, sp. nov. *Arbor* ramulis gracilibus, *foliis* minusculis oblongis acuminatis acutis supra glabris subtus puberulis brevissime petiolatis, *stipulis* a basi lato subulato-acuminatis, *cymis* manifeste pedunculatis, *calycis* tubo obsoleto lobis elongatis linearibus planis nec subulatis demum patentibus rigidiusculis, *corollæ* lobis oblongis parum acuminatis.

Hab. Madagascar; Port Dauphin, in woods, *Scott Elliot*, 2749! in Herb. Mus. Brit.

Readily distinguished by its arboreal habit, pedunculate inflorescence, and the characters of the calyx. The leaves are from 6–6·5 cm. long and rather more than 2 cm. wide; peduncles 4–5 mm. long; calyx-lobes 11–12 mm. long and 1 mm. wide. Corolla-lobes 4–5 mm. × 1·5–2 mm., tube very short.

3. **Flagenium latifolium**, sp. nov. Ramulis minute strigillosis, *foliis* elliptico-oblongis latiusculis utrinque nisi subtus in vena media strigillosis glaberrimis breviter acuminatis basi rotundatis nonnunquam obliquis petiolo brevissimo, *stipulis* brevibus acuminatis, *cymis* subsessilibus, *calycis* tubo brevi tamen manifesto laciniis elongatis setaceo-subulatis.

Madagascar: *Chapelier*! ex Hb. Kunth. Hb. Berlin.

At once separated from the other two species by the much broader leaves, 8·5–9 cm. long and over 4 cm. broad, and the shorter stipules—less than 5 mm. long—as well as by the almost complete glabrousness of the under surface of the leaves. The petioles are about 4 mm. at most, and the stipules are the same length. The calyx-lobes exceed 1 cm. in the flower-bud and attain 14–15 mm.

BOTANICAL NOTES FROM PORTUGAL.

By W. E. Nicholson.

In May, 1911, I spent a short holiday in Portugal in the company of Mr. H. N. Dixon, F.L.S. Most of our time was spent in the southern province of Algarve, where we stayed for ten days at Caldas de Monchique. Our main object was to study the interesting bryology of the district, and our observations on the higher plants, being more or less incidental only, were necessarily very imperfect, but as the district is but little visited, some account of the principal plants observed may not be without interest, if only to direct the attention of British botanists to what is obviously a very rich region.

Our own attention was largely drawn to the region by a perusal of Count von Solms Laubach's *Tentamen Bryo-Geographiæ Algarviæ Regni Lusitani Provinciæ* (Hals, 1868), which, though primarily concerned with the bryology of the district, gives an interesting outline of its physical characteristics and general botany. An interesting account of a rather rapid excursion through the district earlier in the year was also recently given by Prof. R. Chodat in his *Excursions Botaniques en Espagne et au Portugal* (Geneva, 1909).

The Serra de Monchique, towards the foot of which Caldas is situate, is a chain of rounded hills, covered with vegetation to their summits, rarely giving rise to cliffs or rock surfaces except in the barrancos, and reaching a maximum elevation of 3000 ft. in Foia above Monchique. The chain is almost exclusively composed of granite, and the only limestone which we came across was in the low ground near the coast at Portimão and Silves, where, in spite of more intensive cultivation, the effect on the flora was very marked. The hills are sparsely wooded, though there are remains of what was no doubt a fairly extensive chestnut forest near the town of Monchique. They are mostly covered with a maquis of very varied composition, but rich in *Cistus*, especially *C. ladaniferus* var. *maculatus*, which occasionally grows in almost exclusive formations. The unspotted form, though treated by Willkomm and Lange as the type, is very much rarer; indeed, we only saw a very few plants of this as compared with many thousands of the var. *maculatus*. The rare and local *Myrica Faya*, which may reach a height of over twenty feet, is also a prominent constituent in places. Round the springs near the summits of some of the higher hills there are here and there small shallow formations of peat, and here *Rhododendron bœticum* Bss. grows freely, and is clearly native, though its specific distinctness from *R. ponticum* L. is less obvious.

Among the rarer plants seen by us in the district was *Cheilanthes hispanica* Mett., which was not uncommon on rather dry rocks near Caldas de Monchique.

The following is a list of the principal plants observed by us in Algarve, which have been arranged in accordance with the system adopted by Willkomm and Lange in their *Prodromus Floræ Hispanicæ*.

Caldas de Monchique and the surrounding Hills.

Gymnogramme leptophylla Desv.
Cheilanthes odora Sw.
C. hispanica Mett.
Selaginella denticulata Spring.
Pinus pinaster Ait.
P. pinea L.
Juniperus phœnicea L.
Colocasia antiquorum Schott.
Anthoxanthum Puelii Lec.
Andropogon hirtum L.
  var. *longearistatum* Wk.
Chæturus fasciculatus Lk.
Airopsis globosa Desv.
Trisetum neglectum R. & S.
Briza minor L.
B. maxima L.

Melica major Sibth.
Vulpia myuros Gmel.
V. alopecurus Lk.
Brachypodium distachyon P.B.
Carex Linkii Schk.
Scirpus Holoschœnus L.
Fuirena pubescens Kunth.
Cyperus longus L.
Gladiolus illyricus Koch.
Iris Xiphium Wk.
Trichonema Bulbocodium Ker.
Serapias cordigera L.
S. occultata Gay.
S. lingua L.
Limodorum abortivum Sw.
Juncus capitatus Weig.
Asparagus horridus L.
Asphodelus albus W.
Uropetalum serotinum Ker.
Scilla monophyllos Lk.
Urginea Scilla Steinh.
Ornithogalum unifolium Gawl.
Cytinus Hypocistus L.
Myrica Faya Ait.
Quercus suber L.
Q. coccifera L.
Urtica membranacea Poir.
Rumex bucephalophorus L.
Osyris alba L.
Daphne Gnidium L.
Aristolochia bœtica L.
A. longa L.
Valerianella microcarpa Lois.
Pulicaria odora Rchb.
Gnaphalium luteo-album L.
Helichryson Stœchas DC.
Coleostephus myconis Cass.
Andryala integrifolia L.
Laurentia tenella DC.
Jasione montana L.
var. *echinata* Wk.
Campanula Rapunculus L.
C. primulæfolia Brot.
Asperula arvensis L.
Crucianella angustifolia L.
Galium setaceum L.
Lonicera implexa Ait.
Rhododendron bœticum Bss.
Erica australis L.
E. lusitanica Rud.
E. scoparia L.
Erica umbellata L.
Plantago psyllium L.
Lavandula stœchas L.
L. viridis Ait.
Sideritis hirsuta L.
Echium plantagineum L.
Anchusa undulata L.
Lithospermum prostratum Lois.
var. *erectum* Coss.
Cynoglossum pictum Ait.
Omphalodes linifolia Mnch.
Convolvulus siculus L.
C. althæoides.
Scrophularia canina L.
Anarrhinum bellidifolium (L.) Desf.
Antirrhinum Orontium L.
Trixago apula Stev.
Odontites viscosa L.
Phelipæa cærulea C. A. Mey.
P. ramosa C. A. Mey.
Asterolinum stellatum Lk.
Anagallis cærulea Lk.
A. linifolia L.
Cicendia filiformis Delarb.
Erythræa maritima Pers.
E. centaurium Pers.
var. *grandiflora* Pers.
Phillyrea latifolia L.
P. media L.
P. angustifolia L.
Corrigiola littoralis L.
C. telephiifolia Pourr.
Illecebrum verticillatum L.
Chætonychia cymosa Wk.
Paronychia echinata Lam.
Myrtus communis L.
Poterium agrimonioides L.
Scorpiurus sulcatus L.
S. vermiculatus L.
Ornithopus compressus L.
Astragalus lusitanicus Lam.
Biserrula Pelecinus L.
Psoralea bituminosa L.
Lathyrus Clymenum L.
L. sphæricus Retz.
Lotus parviflorus L.
Trifolium glomeratum L.
T. suffocatum L.
T. resupinatum L.
T. tomentosum L.

Trifolium stellatum L.
T. subterraneum L.
Genista triacanthos Brot.
Ulex opistolepis Wbb.
Lupinus luteus L.
Ruta chalepensis.
Linum gallicum L.
Lavatera olbia L.
Arenaria montana L.
A. modesta Desf.
Eudyanthe læta Rchb.
Silene hirsuta Lag.
Silene crassicaulis Wk.
Cistus crispus L.
C. salviæfolius L.
C. populifolius L.
C. ladaniferus L.
  and var. *maculatus* Dum.
Tuberaria variabilis Wk.
Cleome violacea L.
Draba muralis L.
Ranunculus bupleuroides Brot.
Anemone palmata L.
Pæonia Broteri Bss.

PORTIMAO.

Kœleria phleoides Pers.
Lagurus ovatus L.
Gynandriris Sisyrinchium Parl.
Ophrys speculum Lk.
Asphodelus fistulosus L.
Chamærops humilis L.
Cynomorium coccineum L.
Phagnalon sordidum DC.
Soliva lusitanica Less.
Centaurea pullata L.
Vaillantia muralis L.
Plantago albicans L.
Phlomis purpurea L.
Melittis Melissophyllum L.
Nicotiana glauca Graham.
Thapsia villosa L.
Paronychia argentea Lam.
Polycarpon tetraphyllum L.
Anthyllis Vulneraria L. (form).
Trifolium angustifolium L.
T. Cherleri L.
Ononis reclinata L.
O. natrix L.
Rhamnus oleoides L.
Linum strictum L.
Malva parviflora L.
Malcolmia littorea R. Br.
Nigella damascena L.

SILVES.

Ægilops ovata L.
Chamærops humilis L.
Atractylis humilis L.
Centaurea pullata L.
Tolpis barbata Willd.
Micromeria græca Benth.
Salvia silvestris L.
S. argentea L.
Cleonia lusitanica L.
Ajuga Iva Schreb.
Teucrium Polium L.
Anchusa italica Retz.
Cerinthe major L.
Medicago orbicularis All.
M. obscura Retz.
M. littoralis Rhode.
Ruta montana Clus.
Malva hispanica L.
Cistus monspeliensis L.
Biscutella auriculata L.

A few days were also spent in Lisbon, whence we explored the interesting country between Cintra and the sea, which is rather rich botanically, as limestone, granite rock, and sand-dune can all be examined in the course of a single walk. The famous gardens of Monserrate, originally laid out by Beckford, are in this district. Among the fresh plants noticed were:—

Scolopendrium Hemionitis Lag.
Davallia canariensis Sm.
Phalaris bulbosa Cav.
Scirpus Holoschœnus L.
Cyperus schœnoides Griseb.
Iris Xiphium Wk.
Ophrys fuciflora Reich.
Crucianella maritima L.

Bupleurum protractum Hffg.
Coronilla scorpioides Koch.
Ornithopus durus Cav.
O. ebracteatus Brot.
Onobrychis caput-galli Lamk.
Astragalus pentaglottis L.
Lathyrus Aphaca L.
Spartium junceum L.
Ulex densus Welw.
Corema album D. Don.
Lavatera trimestris L.
Silene ciliata Pourr.
Halimium umbellatum Spach.
Fumaria spicata L.

From Lisbon a flying visit was made to the university town of Coimbra, and to Bussaco, famous not only for the engagement in the Peninsular War, but also for its woods, and especially the fine specimens of the "Goa cedar," which, however, is neither a cedar nor from Goa, but a handsome, somewhat flat-topped species of cypress (*Cupressus lusitanica* Mill.) of Mexican origin in spite of its name. A short excursion was also made from Coimbra to Louzá, where the dry hillsides and a fine ravine yielded a few interesting plants. Among the fresh plants seen were:—

At Coimbra.

Rhagadiolus stellatus DC.
Omphalodes lusitanica Pourr.
Scrophularia sambucifolia L.
Genista tridentata L.
Erodium Botrys Bert.
Geranium rotundifolium L.
Ranunculus muricatus L.
Antirrhinum Orontium L. var. *calycinum* (Lk.)

Bussaco.

Potentilla splendens Ramd.

Louzá.

Macrochloa arenaria Kunth.
Armeria elongata Hoff.
Dianthus lusitanicus Brot.
Astrocarpus Clusii J. Gay.

We are indebted to Mr. G. C. Druce, F.L.S., and the Baron de Soutellinho for the identification of several of the plants.

NOTES ON JERSEY PLANTS.

By C. E. Salmon, F.L.S.

In April, 1910, I had a week's botanizing in Jersey with Mr. J. W. White, and we were joined on one or two excursions by Mr. G. C. Druce. I should mention, too, that, thanks to Mr. L. V. Lester-Garland we saw several interesting plants we should otherwise have missed.

A good deal of attention was given to the *Cerastia* of the sandhills, and some time has been spent in working them out; of more interest, perhaps, was the discovery of a grass new to the Channel Islands and to Britain—*Poa exilis* Murb.—and it is proposed shortly to figure and describe it in this Journal.

A visit to the late Mr. J. Piquet elicited the information that he had planted *Allium sphærocephalum* at St. Ouen's Bay, as he considered the well-known station in St. Aubin's Bay doomed by building.

Ranunculus flabellatus Desf. Quite a respectable patch—not yet in flower—found in a new station more than two miles from the St. Aubin's locality, where it was also observed, and additional to those mentioned in Journ. Bot. 1910, 188.

Barbarea intermedia Bor. Roadsides south-east of St. Ouen's Pond and north-west of Becquet Servais.

Cerastium tetrandrum Curt. var. nov. *dunense*. On the Quenvais sandhills (and on the Vazon Bay shore, Guernsey) a remarkable *Cerastium* attracted notice. It was robust, prostrate, very glandular (often with grains of sand adhering), its leaves large and fleshy, and the branching (and often purple colouring) reminding one strongly of *Euphorbia Peplis*.

I cannot find any recorded descriptions that may apply to this sand-form, and after comparing a series of specimens with examples of the type, further distinguishing characters came to light; hence I venture to suggest that it may be convenient to name it var. *dunense*, with the following diagnosis:—Planta prostrata, glandulosissima, rami et folia crasso-carnosi, calyx et capsula grandiores et latiores quam in typo, capsula tertia parte usque ad dimidium sepalis longior et perspicue curvata.

Specimens in Herb. Mus. Brit. labelled "S. Aubin's Bay, Jersey, 24 April, 1871, H. Trimen" are apparently identical with the above, but the collector's decision (Journ. Bot. 1871, 199) that they should be placed under *C. pumilum* Curt. is not a sound one, I think, nor will they match the *C. pedunculatum* Bab. or *C. atrovirens* Bab. (Mag. Zool. & Bot. ii. 200, 317, 1838).

Examples distributed by F. Schultz, Herb. Norm. Cent. 7, 620, seem exactly the var. *dunense*; these came, as one might expect, from the nearest French coast to Jersey, in the Manche Department.

C. semidecandrum L. var. **congestum* Gren. Abundant on the sandhills, St. Aubin's Bay.

This is described by Grenier as follows in Monog. Cerast. 1841, 29:—"Pedunculis brevissimis, floribusque abbreviatis, congesto-umbellatis, numerosis, densis, calicibus globosis, capsulaque calicem vix excedente."

This description seems to fit the Jersey plant, which was quite noticeable by its crowded heads of flowers, remarkably short peduncles and short capsules, well retaining these characters in a large series gathered. It is quite glandular, and grains of sand are usually to be found adhering to the upper parts. Rouy & Foucaud (Fl. France, iii. 1896, 219) do not mention this name *congestum* as a synonym for any of the six varieties given under *C. semidecandrum*, and none of the descriptions of these seems to suit the Jersey form.

Sagina ciliata Fr. Portelet Bay.

Spergula arvensis L. var. *nana* Linton. West Mount; Portelet Bay.

Montia chondrosperma Fenzl. Near First Tower.

Trifolium suffocatum L. Portelet Bay.

Anthyllis maritima Schw. Portelet Bay. Apparently quite distinct from ordinary *Vulneraria*, attracting notice by its fleshy, silvery-hairy leaves, large pure yellow flowers, &c.

**Prunus avium* L. Rocky slope near Grand Val Mill. Apparently new to Jersey, but perhaps planted.

Taraxacum erythrospermum Andrz. The Quenvais.

T. palustre DC. var. *udum* (Jord.). Near St. Ouen's Pond.

Anagallis arvensis L. var. *carnea* Schrank. A true native on the wild coast at Noirmont Point.

Myosotis collina Hoffm. var. **Lebelii* (Gren.). Portelet Bay.

M. versicolor Sm. var. *Balbisiana* (Jord.). Near First Tower.

†*Anchusa sempervirens* L. Roadside near Brook Vale, St. John's.

Scleranthus annuus L. var. *cæspitosus* Neilr. In short turf near St. Catherine's Breakwater. Probably only a form of exposed cliffs.

Daphne Laureola L. In a wood by stream running into Grand Vaux Valley. Apparently very rare in Jersey and unknown in the other Channel Islands.

Spiranthes spiralis Koch. St. Catherine's Bay.

Allium triquetrum L. Roadside north of Mont à la Brune, St. Ouen's Bay, and near Fort Regent, St. Helier's.

Festuca rottbœllioides Kunth. Portelet Bay.

Ceterach officinarum Willd. One plant seen on a wall at Bagot; it was hoped there might be more on the other side!

Gymnogramme leptophylla Desv. This delicately fragile fern was seen in good quantity and condition in two localities.

LINNÆUS'S 'FLORA ANGLICA.'

A word or two may be given in further explanation of my paper in the *Scottish Botanical Review* i. p. 154, 1912, on which Mr. Britten comments in this Journal for 1912, p. 312. I thought it would be quite evident from my statement on p. 158 that I was using the reprint which appeared as a Supplement to the Journal for 1909. In this there is no difference in the text to suggest that *Salicornia fruticosa* is intended as a variety, as is evident from the form in which it is stated:—

"Salicornia europ. 136–1.
fruticos. 136–2":

The alignment and the type are exactly similar in the case of both names, there is nothing to indicate that the second is a variety of the first. If in the original edition it is given as a variety, the reprint should so have marked or explained it, and my contention that *Salicornia fruticosa* might be cited as of "Linn. Fl. Anglica" falls to the ground; but in that case a further example is added to those I have previously mentioned, which go to show that the *Flora Anglica* should be ignored.

Mr. Britten says he reprints my note on *Salicornia* with "necessary corrections." The "corrections" are the addition of the figure 3 to the page, which had dropped out in the press:

and he inserts in brackets "there are no additions to the synonymy." But a glance at the works alluded to show that in Ray. Syn. 136, 1724, we have "*Kali geniculatum perenne fruticosus procumbens* Syn. ii. 62, 2, and *geniculatum lignosum* Pet. H. Br. 9, 4," while in the *Species Plantarum*, p. 5, 1762, Linnæus has inserted "*Salicornia caule erecto fruticoso*," which is not to be found in the first edition of 1753, and gives also the synonyms taken from the first edition of "*Salicornia sempervirens* Sauv. Monsp. 7, and *Kali geniculatum majus* Bauh. Pin. 289," which are not given in Ray's *Synopsis*, and, as I have said, do not, I think, refer to our British plant.

According to the view of Dr. Moss, which I have in no way controverted, we have in the first edition of *Species Plantarum* var. *fruticosa* meaning one plant, in the *Flora Anglica* another, while in the second edition of the *Species Plantarum* the original variety is raised to specific rank. But Linnean commentators cannot have it both ways; they cannot run with the hare and hunt with the hounds. I may add that I have not associated the plant of the *Species Plantarum* with any name. My remarks are limited to the plant of *Flora Anglica*, which is based on the *Synopsis* 136–2, this being *S. radicans* Sm., which is *teste* Dr. Moss *S. perennis* Miller.

If *Salicornia fruticosa* is written as a specific name (as in the reprint) in *Flora Anglica*, and assuming that the work is available for citation, it necessarily follows that it has priority over the variety in the edition of *Species Plantarum* mentioned. Competent botanical critics such as R. A. Pryor and, I believe, the Messrs. Groves, have interpreted such names in a specific and not varietal sense, and if the typography of the reprint is correct they are not printed in italics, as is usually the custom of Linnæus in the *Species Plantarum*. But really my note on *Salicornia* is quite an insignificant portion of my paper, being only used to illustrate the difficulties which the acceptance of the *Flora Anglica* for botanical citation might lead us into, and I think Mr. Britten has blurred the issue by dwelling too much upon matters which are really irrelevant to or have only a slight connection with the point under discussion.

May I reiterate that the *Flora Anglica* is practically a skeleton list of *nomina nuda*, with identifications (such as they are) based entirely on synonymy, without actual reference to plants for comparison, or even to any other works dealing with English botany; and, it is evident, was deliberately ignored by Linnæus in all his subsequent writings. The list as I have shown bristles with errors, and much of it, especially with regard to the new plants added to the *Synopsis* by Dillenius, is merely guesswork.

In unearthing it from oblivion, where it has remained unquoted and unsought for more than one hundred and fifty years without any loss to botanical literature, nothing would be added to the credit of its illustrious author, but, on the contrary, I am convinced if it were brought into the arena of citation, it would lead to unnecessary changes of plant-names, which would cause additional confusion. Not only has this obscure memoir failed to arouse any serious interest among those who are concerned with nomenclature, but European correspondents have assured me that it is hardly likely to be quoted in the future in systematic works.

I may just add that the determinations of the plants referred to in my paper in question are to be found in the account of *The Dillenian Herbaria*, issued as a volume under the auspices of the Clarendon Press in 1907.

G. Claridge Druce.

I publish the foregoing remarks by Mr. Druce at his special request; I had told him that I did not think they added anything of value to the discussion, but he seems to think that in fairness to him they should be printed, and I have thus no alternative but to comply.

His first contention rests on the "alignment and type" of the reprint of the *Flora Anglica*, which, he assumes, differ in some way from the original. He says that he "thought it would be quite evident from [his] statement on p. 159" of his article in the *Scottish Botanical Review* that he "was using the reprint": I can only say that I find no reference to the reprint on the page in question; indeed, the only allusions I find to the reprint throughout his paper are on pp. 158 and 154, where he says "the figures of the references" are taken from it. There is nothing else to suggest that Mr. Druce had not the original publication before him, and I am surprised to learn that he should not have taken the trouble to consult this. Had he done so, he would have seen that his contention falls at once to the ground, for the "alignment and type" in the *Journal of Botany* reprint exactly follow those of the original Dissertation, which are identical with those of the reprint in the *Amœnitates*.* It is the more surprising that Mr. Druce should base any argument on the "alignment," as I had especially pointed out in my remarks (p. 313) that "the printing of the Flora in double columns necessitated the placing of the varietal name under that of the species"; had he referred to either of the originals, which are combined in the reprint, he would have seen that this double-column arrangement occurs in each of them. Mr. Druce's statement that "it was usually the custom of Linnæus in the *Species Plantarum*" to print the names of varieties in italics is true only as to the second edition, as he will see if he will turn to the plant under discussion on p. 3 of the first.

Mr. Druce controverts my statement that "there are no additions to the synonymy" in the second edition of the *Species Plantarum*. The simplest way of settling this question seems to be to print the synonymy as it stands in the two editions. The first edition has:

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* I may note here that the word "herbac" has been accidentally omitted after "fruticosa" in the J. Bot. reprint.

"*β*. Salicornia sempervivens [*sic*]. *Sauv. monsp.* 7.
Kali geniculatum majus. *Bauh. pin.* 289."

In the second edition, the plant being raised to specific rank, Linnæus adds a *descriptive phrase*, but the *synonymy* is identical:

"Salicornia caule erecto fruticoso.
Salicornia sempervirens. *Sauv. monsp.* 7.
Kali-geniculatum majus. *Bauh. pin.* 289."

Ray's *Synopsis* is in no way referred to in either, and the *Flora Anglica*, which refers to Ray and by implication includes his synonymy, is, as Mr. Druce points out, "ignored by Linnæus in all his subsequent writings," and thus of course is not quoted in ed. 2 of the *Species*.

I do not think I need enter upon the discussion of the further points raised by Mr. Druce, most of which appeared in his original paper, and have already been commented upon in my remarks upon that. I cannot however see that it was, as he seems to suggest, little short of criminal to reprint the *Flora Anglica*, although I should deprecate, at least as much as he can do, its use in creating "unnecessary changes" or combinations which would "cause additional confusion." But if it is "hardly likely to be quoted in systematic works," we may hope that this danger is not imminent.

JAMES BRITTEN.

SHORT NOTES.

SPECIFIC NAMES AND CAPITAL LETTERS (Journ. Bot. 1912, 375).—According to the present international rules of botanical nomenclature, specific names should begin with capital letters only: (1) when they are old generic names, and (2) when they commemorate some person. It is often difficult, without spending a great deal of time in searching old volumes, to be certain whether a given specific name is called after an old genus or not. Should botanists write *Salix Caprea*, as in the first edition of Linné's Sp. Plant. (p. 1020, 1753), or *Salix caprea*, as in the second edition (p. 1448, 1763)? Dr. Jackson, in the note cited above, has gone thoroughly into the question of specific names ending in *-oides*, all of which, in Mr. Druce's *List*, are spelt with initial capitals; but whilst we now know which of these trivials were once used as generic names, how are we to know, in any particular case, whether the name in question commemorates an old genus or is merely used in a descriptive sense? It would save much time if botanists decided to begin every specific name with a small letter; and this is the plan which I favour. It should be remembered that at present many specific names spelt with an initial small letter are substantives, as in *Vicia sepium*, and that the specific names ending in *-oides*, some (but not all) of which should sometimes (but not always) be spelt with an initial capital letter, are adjectives. Although, at first, it would cause a slight shock to see *Hieracium leyi* instead of *Hieracium Leyi*, botanists would not be long before becoming accustomed to the sight. In this country they already write *Ulex europæa* without any undue pangs of remorse, and evince no inordinate longings to revert to *Ulex Europæa*, a usage which, though not countenanced by the rules, is still adhered to in some large modern floras. It cannot be said that the rules relating to this matter are logical, if judged by the canons of English grammar, for a specific name must be spelt with a small letter if it is called after Wiltshire, the county, but with a capital letter if called after Wiltshire, a man. The adoption of a rule to spell all trivial names with small letters would spare us the glaring misuse of capitals in popular and semi-popular articles on botanical subjects, though botanists themselves are scarcely in a position to throw stones at the perpetrators of such errors, for who are the botanists who do not live in glasshouses? The suggested rule is already in use among some fossil botanists and among zoologists in general; and its adoption by all other biologists would entail no sacrifice of principle, but would result in a real saving of time.—C. E. Moss.

[Dr. Moss is of course aware that his proposal directly controverts Recommendation x. of the Vienna Congress: it seems to us undesirable to depart from a practice which is sanctioned both by rule and custom.—Ed. Journ. Bot.]

Viola calcarea Gregory.—Dr. Williams, in his *Prodromus* (p. 581), gives *V. parvula* Opiz as an earlier name for this plant. This no doubt is so, but the reference to the "Böhm. Gewächs. 1823" is not the first description by Opiz; this occurs in the *Naturalientausch*, p. 47, 1821. But even if retained only as a variety, I think the name must be quoted of Kosteletzky, Clavis anal. in Fl. Bohemiæ phan. p. 38, 1824, where he describes it as "*V. hirta β parvula* Opiz." Many species are only named in the Gewächs. without description. The *Naturalientausch* is rare as a complete work; the author's own copy in the Prague Museum has 1–722 pages (Preface dated "26 Juin 1816"), 1819–1829. In it he describes, besides forty-two species of *Mentha*, ninety-five Phanerogams and twenty-seven Cryptogams. See Déséglise in Ann. Soc. Bot. de Lyon, 1879–80.—Arthur Bennett.

Ulex minor Roth (nanus Forst.) (Journ. Bot. 1912, 378).—Mr. H. W. Pugsley in his note has mistaken the record in Townsend's *Flora of Hants* of the occurrence of *Ulex minor* Roth in the Isle of Wight. Besides the localities which Mr. Pugsley mentions, and which he states are the only ones given in the Flora, four others are given, with the addition—"and in other parts freq." It is, in fact, almost equally as common as *U. europæus*.—Fred. Stratton.

[Mr. Pugsley tells us that he wrote "South Wight," which has been misprinted "Isle of Wight" in the passage referred to.—Ed. Journ. Bot.]

REVIEWS.

British Violets. A Monograph. By Mrs. E. S. Gregory. With an Introduction by G. Claridge Druce, M.A., F.L.S. Cambridge: W. Heffer & Sons, Ltd. 1912. Cloth, large 8vo. Pp. xxiii. 108. Price 6*s.* 6*d.*

This book, the outcome of more than a quarter of a century's special study of the *Nomimium* section of the genus, is well printed on good paper, with ample margins; there are thirty-four illustrations in black and white, about half of them full-page ones, mostly drawn by Miss W. Mills: a few are photographic reproductions of specimens in the author's herbarium, from which the drawings have also usually been made. Twelve species are enumerated, besides twenty-seven varieties (three new), nineteen forms (one new), and seventeen hybrids; of these last, however, five are variants between *V. hirta* and *V. odorata*, one is a compound of three species, and two or three are the product of crosses between a species and a variety of another. At first sight so much subdivision may seem excessive; it is, indeed, a general tendency of specialists to exaggerate minor differences: still, these exist in nature, and deserve recognition. The number might easily have been increased; but, on the whole, a middle course seems to have been fairly steered, though the named varieties and forms are by no means uniform in values.

Mrs. Gregory has been fortunate in her many helpers and correspondents, whose assistance is handsomely acknowledged; her son, Mr. R. P. Gregory, did much towards the final shaping of the work, and provided several insets of single flowers and stipules.

Mr. Druce, who also contributed a large and valuable amount of material, gives a useful summary of the progress of violet-study in this country from Lobel and Gerard onwards, including a comparison of the names given in Syme's *English Botany*, the third edition of Hooker's *Student's Flora*, and the ninth edition (by Messrs. Groves) of Babington's *Manual.*

"In its general lines the arrangement follows that of Borbás in Koch's *Synopsis Deutsch. u. Schweizer Flora* (1892), but the omission of such Continental violets as have not been recorded for Britain necessitates some modification of Borbás's system" (Preface, p. xvi.).

The Linnean Herbarium has been studied, as well as the collections at South Kensington, Kew, and Cambridge; but the localities given are comparatively few, and scant notice has been taken of recent records in this Journal, or elsewhere. The distribution in the case of *V. lactea* Sm., for instance, is very incomplete; it is here credited to only six vice-counties, whereas twenty-one are specified in *Topographical Botany*, ed. 2, and Mr. Bennett's *Supplement* (1905), and two more are known for it. An identification of the numerous critical forms and alleged hybrids in the National Herbarium would have been welcome;

still, considering the author's busy life and advanced age (which her friends would hardly have guessed), the amount of information supplied and the freshness of style are remarkable: and it may be added that in this genus, owing to the fugitive colour of the blossoms, the precise determination of dried material is extremely difficult. "In the Cambridge Botanic Gardens Mr. Lynch has kindly allowed the writer to make some necessary experimental tests, especially with regard to the now exploded theory that *Violæ* rely on their cleistogamous capsules only for fertile seed" (Preface, p. xiii.). It is suggested (p. 103) "that a great deal of most interesting work remains to be accomplished [in connection with intermediates having the appearance of hybrids], which would be more successfully done *in situ*. Moving these few plants to garden soil and conditions does not tend towards a full knowledge of their characters." This may be true to some extent, and artificial cross-fertilisation affords the only real solution of many problems; yet the cultural experiments of Mr. Beeby and one or two others had encouraging results.

Although I have paid some attention to our violets, my acquaintance with them is so fragmentary, so incomplete, and so little up-to-date, that for me to attempt a review of this Monograph is (to say the least) rather rash; and I have only done so, *faute de mieux*, by the Editor's desire. It should, therefore, be clearly understood that my comments are mere *obiter dicta*, and should not be taken too seriously.

Mr. F. N. Williams (Prodr. Fl. Brit. Part 10, pp. 574, &c. Sept. 1912) adopts the same nomenclature as is here adopted for his nine species of this group, reducing *V. calcarea* Gregory, *V. rupestris* Schmidt, and *V. montana* L. to varieties, as *V. hirta β calcarea* Bab., *V. silvestris β rupestris* Maxim., and *V. stagnina β Kützingiana* Rouy & Fouc., respectively; the remaining variations and the hybrids being, with one exception, passed over. With regard to the first, Mrs. Gregory herself admits (p. 28) that, although it is a widely different plant in apppearance from *V. hirta* (type), the two are connected by a whole series of intermediates; but Babington's var. *calcarea* included forms which clearly belong to *V. hirta*, and (as a matter of convenience, if not for better reasons) her species may be retained with some advantage. *V. rupestris* var. *arenaria* (DC.), our Teesdale plant, differs greatly from *V. silvestris* in its habit, foliage, and downy capsules, and seems to me to be much nearer in general appearance to small forms of *Riviniana*, but quite distinct. *V. montana* (*V. nemoralis* Kütz.) I only know from dried material; Mrs. Gregory and Dr. Moss kindly took me to its only British station, last June, but we failed to see it (though it was fairly plentiful a few years ago), probably owing to the dense overgrowth having prevented it from flowering. The author says (p. 102):—"I have my doubts as to whether *V. montana* L. is a good species, and should not be surprised if it turned out to be a hybrid between *V. canina* var *lucorum* and *V. stagnina*." Its robust habit and general appearance mark it off strongly from

V. stagnina, which is an exquisite and delicately beautiful violet; and I rather suspect that it is either a primary or (if hybrids of the fen-species are fertile) a secondary cross, *stagnina* being the subordinate parent.

With regard to the intermediates between *V. hirta* and *V. odorata* (*V. sepincola* Jord., *V. permixta* Jord., &c.), it may be argued, first, that such polymorphic species are likely to produce a great diversity of hybrid offspring (as, indeed, I found to be the case, when I lived in West Sussex), some scentless, others fragrant; and secondly, that mongrels are probably not rare, as the first crosses normally bear numerous capsules, and may be fertilised by one or other of the parent species. In such a case, the multiplication of special names appears to be needless. *V. imberbis* Leighton, retained as *β imberbis* Henslow by Mr. Williams, is reduced to a form in the Monograph.

V. epipsila Ledeb., our most recent addition, has already been found in five English and Welsh counties, as well as in Kerry; besides the type, a variety (*glabrescens* Asch. & Graebn.) and a form (*minor* Gregory) are figured, and a luxuriant, white-flowered hybrid with *V. palustris* is recorded from Dartmoor.

On p. 74 the following note occurs:—"Mr. A. J. Wilmott (Journ. Bot. xlix. 289–293 (1911)) has shown that, in strict accordance with the rules of synonymy, the name *V. canina* Linn. 'should be used for the plant which has, since 1823, been called *V. Riviniana* . . .' I propose, however, to follow the arrangement adopted in the *London Catalogue of British Plants*, ed. 10, and in Babington's *Manual of British Botany*, ed. 9, revised by H. & J. Groves. Accordingly, I adhere to the traditional use of the name as applying to the Dog Violet." The *London Catalogue* is not an authority on nomenclature, the names there adopted only representing the revisers' personal opinion; again, the last edition of the *Manual* was, I believe, in print before the results of the Vienna Congress were known: nor is the traditional view uniform, our earlier post-Linnean writers having acted in accordance with Mr. Wilmott's contention. In fact, the use of *V. canina* L. for either species involves confusion and obscurity; and, however desirable it may be to keep up the names of the *Species Plantarum*, wherever possible, this one seems to be even more objectionable than *Rosa villosa* L. If *V. ericetorum* Schrader (ex Hayne *Arzneygewächse*) is not valid, *V. flavicornis* Sm. may stand.

Many other interesting questions might be discussed; but for these the book itself should be consulted. Enough has, I think, been said to show that Mrs. Gregory has rendered a real service to students of this attractive but difficult genus; thus deserving their best thanks and hearty congratulations.

EDWARD S. MARSHALL.

A Text-Book of Botany. By Drs. Eduard Strasburger, Ludwig Jost, Heinrich Schenck, and George Karsten. Fourth English Edition, revised with the Tenth German Edition by Professor W. H. Lang. With 782 illustrations, in part coloured. Pp. xi, 767. Macmillan & Co. Price 18*s.* net.

The University student making botany a chief subject for his degree must realize that the subject is too wide to be adequately dealt with by one author or in a single volume. There are, however, many other students, such as those of our medical and pharmaceutical schools, or even of the more advanced classes in general secondary schools and polytechnics, who do undoubtedly demand a single volume giving a comprehensive view of the science—or, at least, of its main divisions, anatomy, and physiology. It is far better that they should have this from the hands of eminent original workers than from even the best of mere compilers of other men's labours; and, during the last decade, at least, the volume familiarly known as "Strasburger" has, by very general consent, been recognised as filling this place. That its bulk has increased from 632 pages in the first translated edition to 767 in the present one, is merely the inevitable growth with the advance of the science; but it has undergone many other important changes in addition to this expansion. The student has from the first had in his "Strasburger" the advantage of the cooperation of four distinguished German scholars, Strasburger's own contribution occupying only about a quarter of the book, and the Cryptogamia being described by Professor Schenck. In the first edition, that of 1898, these two botanists had as their associates Dr. Fritz Noll and Dr. A. F. W. Schimper, and there was nothing on the face of the work to indicate the share which each of these four authors had in it. The present edition contains a new section on Physiology by Professor Jost, and one on the Phanerogamia by Professor Karsten. This means that the larger half of the book is new, which fact, coupled with other extensive changes, fully justifies Professor Lang in omitting the name of the original American translator from the title-page. We are, however, still left to gather the respective responsibilities of the authors from the headings of the "Index of Literature" now added at the end of the work.

We have always thought "Strasburger" a most remarkable work, as emanating from German universities, in its freedom from the national verbiage. The student may well be grateful to find here, from the hands of the much deplored master, the essentials of histology, without being burdened, for instance, with the controversial details of a stelar theory; while nothing can well be more masterly than the notes on methods which in Strasburger's section are relegated to "lower case." Mitosis—under its longer name, karyokinesis—necessarily becomes prominent, for the distinction between "ordinary" and "reduction" divisions of the nucleus, or the "haploid" and "diploid" phase, underlies much of the work, much as did the distinction between sporophyte and gametophyte in the "special botany" of the higher plants in earlier editions. Another noticeable feature which strikes one on a first perusal is the belittling of the distinction between septate and non-septate multinuclear bodies, so that the term "cœnocyte" does not appear, and the word "cell" is made to embrace such structures as *Botrydium* or *Caulerpa.*

It might have been well in such cases as this, for the sake of students extending their reading to other works, even to include and explain a terminology which is not accepted. These are, of course, matters on which teachers are sure to differ. Personally, for instance, we see no gain in *phlœoterma* over *endoderm*, and we think that the sooner the prefix "medullary" is dropped in writing of the rays the better. So, too, as a question of translation, we fail to see the advantage of "translocation" over "transfer," and we are quite certain that it is less likely to cause confusion if we speak of the "dispersal" rather than of the "distribution" of seeds.

It may well make us humble as to the advance of physiology since the days of Stephen Hales, that it still has to be acknowledged that "no generally accepted solution of the much discussed problem of the ascent of water has yet been attained"; and we remind ourselves of some of the divagations of Ruskin into botanical criticism in complaining that the term "sap," although employed, does not appear to be anywhere explained or defined. It does not appear in the index, and its use on pp. 201–2 in connection with bleeding hardly agrees with that on p. 80 as a synonym for latex. The section on the Assimilation of the Food-materials appears to us one of the most valuable accessions to the whole work, although "CO_2-assimilation" is certainly an awkward expression for speech, if not for writing.

The section on Cryptogamia is certainly comprehensive, since it comprises descriptions, all too brief, of the Myxomycetes and Flagellata now mostly relegated to the animal kingdom. The convenient recognition of the Lichenes as a distinct Class of Thallophyta raises the number of Classes, stated as fourteen on p. 332, to fifteen. Excellent as is the summary account (pp. 470–2) of fossil Cryptogams, considering the immense importance of the questions connected with them, more space might be given to this topic. Fossil gymnosperms are somewhat more adequately treated (pp. 540–3); but the half page given to fossil angiosperms (pp. 714–5) seems altogether insufficient.

Modern views as to the probable origin of the Monocotyledons, which are well summarised, lead to the treatment of this sub-class at the close of Prof. Karsten's excellent section on Phanerogamia, under which, by the way, the once popular term "Spermaphyta," the inaccurate form of "Spermatophyta," finds only the barest incidental mention. It is chiefly in this section of the work that the beautiful coloured text-figures of official species, which must render the book peculiarly attractive to the pharmacist, occur. One of these on an earlier page, however, that of *Laburnum Adami* Poit., is a lesson on graft-hybrids in itself.

It is, perhaps, an advantage to have the bibliography together at the end of the volume, instead of at the end of each section, as in the Oxford editions of Warming and Schimper; but in this case either a continuous numbering of the notes should have been adopted, or use should have been made of the page-headings to guide those using these notes to the four different sections under which they are grouped. Out of consideration for the eyesight of readers, moreover, the reference-numbers might well have been larger or in black type. We are afraid that notes placed among these references to literature are too apt to be altogether overlooked. While the printing and general get-up of the volume are of the character usually associated with the house of Macmillan, there are not a few little misprints, especially in the references to figures, which have escaped correction from the earlier editions. These may well be corrected by a page of errata in any reprint which may precede the fifth edition; but in that edition it would add to the convenience of those using the book if the page was added to references to figures in widely distant parts of the volume. The meticulosity of our criticism is but an indication of the great value we attach to the work as a whole, and our consequent wish that it should approach yet nearer to perfection.

G. S. Boulger.

A Hand-list of the Lichens of Great Britain, Ireland, and the Channel Islands. Compiled by A. R. Horwood. Pp. 45. 1*s.* net. Dulau.

This list of British Lichens has been drawn up, as the compiler states, primarily for the use of members of the Lichen Exchange Club, but will be found serviceable for cataloguing herbaria by all collectors. The nomenclature, and to some degree the arrangement, is based upon the recently completed *Monograph of British Lichens* by Crombie and Miss Lorrain Smith. The sequence and system of classification, however, differ rather widely from those adopted in the Monograph, the reasons for the changes made being indicated by the compiler in the introduction. While assuming this arrangement is in accordance with the most recent views, it may still be thought that the sequence of a Manual which must remain *par excellence* the text-book for British students for many years to come might have been more conveniently adopted. One result of the change is that the 123 genera of the B. M. Catalogue are increased to 142, mainly by the raising to generic rank many of Crombie's subgenera, as in *Lecanora.* We do not know what authority Mr. Horwood has followed in placing all the species of *Physcia* under *Xanthoria*, especially as this name, adopted with some reason for the naturally distinct group of yellow forms, becomes meaningless when applied to the cinereous species. Some misprints are inevitable, one supposes, in long lists of hard scientific names: amongst the few observed may be instanced *Anthracotherium*—a word with a very zoological sound—which should read *Anthracothecium.* The list is well got up, in good clear type.

We learn from the Introduction that a popular "account of British Lichens" is in course of preparation by the compiler: as Mr. Horwood adds to his systematic knowledge the experience of an enthusiastic field-botanist, it may fairly be presumed that this book will be of much practical use to beginners, and thus supply an existing want.

H. P. Reader.

The Linnean Herbarium.

Dr. Daydon Jackson, to whose laborious compilations in various directions of bibliography botanists are so greatly indebted, has added one more to his claims on their gratitude in the *Index to the Linnean Herbarium* which forms a Supplement to the Proceedings of the Society for the Session of 1911–12. The title chosen is very modest, for the Index contains not only an enumeration of the plants in the Herbarium "with indication of the types of species marked by Carl von Linné," but an explanation of the signs employed in connection with the specimens and a list of the contributors, with notes as to their share in the collection. These signs, some of which will have attracted the notice of those who have consulted the Herbarium, have been variously explained; it was left for Dr. Jackson to copy them each time they occurred, with the name of the plant to which they were attached, and on the information thus brought together to base conclusions which are not likely to be disputed, and thus to clear up a point which, not itself of special importance, is at any rate of interest, as everything connected with Linnæus must be. In like manner the system of numbering adopted by Linnæus is explained.

Each of the three earlier enumerations of the contents of the Herbarium, Dr. Jackson tells us, is faulty, although that indicated in the copy of the first edition of the *Species* which is in the National Herbarium was made by the usually accurate Dryander. Foreign botanists, as well as those living in this country, will thank the compiler for enabling them to ascertain readily of which of Linnæus's species they can see authentic specimens. They will, however, do well to bear in mind that the specimens in the Herbarium cannot always be accepted as typical for the *Species* of 1753, as additions were made from time to time by various collectors. During the investigations "more than one hundred specimens which had been transferred by Smith to other genera have been replaced, so that the Linnean material is again brought together." In a useful bibliography Dr. Jackson gives the authorities on which his statements are based.

We should have been glad if it had been thought desirable to reprint with the Index the very interesting account of the acquisition of the Linnean Collections which Dr. Jackson prepared for the Centenary Anniversary of the Society and published in the *Proceedings* for 1887–8, pp. 18–29. A slight addition to this account may be made. Dr. Jackson (p. 26, footnote) quotes from Smith's correspondence the remark that he nearly lost the collection "by a plot of Baron Alstrœmer, who wanted to have them, and who procured authority to confiscate the whole after it was sold." A note from Swartz to Dryander (preserved in the volume of Dryander's correspondence in the National Herbarium) attributes the attempt to detain it to Dahl, whose name I think has not hitherto been mentioned in this connection. The fragment is dated by Dryander "Stockholm, 19 June, 1789," and the name Dahl is added by him. It begins "he had picked up in Germany and Copenhagen which also he gave to the Academy"; and continues: "It was just this man [Dahl] who offered 4000 RD. [rix-dollars] for the Linnæan collection, but came to late, when it was shipped and the vessel gone, but in this dilemma, went up to the king, who ordered an expres to be dispatched to the Sound —but then the vessel was already out of the reach. The money was borrowed from Mr. Maule in Gothenbourg and the interrest paid for 3 months. But the sail went on in a so clandestine manner that instead for advertising it in the public papers according to law, it was packed up in the nightime and sent away from Upsala itself, that very few knew it. Indeed I think it now much better that England is in possession of this treasure, as it wil be there of more use to Science than in any other place." Swartz wrote English fluently, but his spelling, which I have preserved, is often inaccurate.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on November 21, 1912, the Rev. George Henslow gave the substance of his paper, "On Vegetable Mechanics," as follows:—The object of this paper is to show that plants respond to gravity, strains, and stresses, in order to resist them and so secure stability. Kerner thought that the stems of herbs and trunks of trees were constructed on a combined system of girders; but if a tree has a heavy mass of foliage borne at the summit of a tall cylindrical stem (as of Mahogany), or even a short one (*Fagus Rumphii*), buttresses are often formed by the roots, which enable the tree to keep the centre of gravity over an extended base. If the stem be hollow, diaphragms are introduced to render it secure. These are in some cases cut-shaped as in East Indian Bamboos, thereby securing a greater "pull" against lateral injury. In tropical lianes, various mechanical contrivances secure strength with elasticity. In *Bauhinia* there are cup-shaped bulgings on either side of a flattened stem. In the Monkey-ladder (*Caulotretus*), besides the bulgings, flanges are added on the edges making a complete girder. In Cucurbitaceæ and *Passiflora* the tendril coils, after securing a hold by its curled tip, the coils being in opposite directions. This is secured by a "crank" being first formed which rotates. In leaves, the distribution of the mid-rib and veins secures the blade from transverse bending and tearing. In bananas, the leaves, being degenerate in character, are invariably torn to shreds by the wind. In flowers adapted to insects various mechanical contrivances enable the calyx and corolla, or the stamens, to support the insect, while others enable it to carry the pollen away. The calyx multiplies its ribs and the corolla expands anteriorly, while the stamens become levers, &c. Fruits are often subject to strains as in bursting, but if a pear hang vertically from an oblique stalk, there is a tendency to tear it away. Nature then develops a hump at the base which counteracts the resultant of the two other forces. The whole of the purposeful structures to secure strength, &c., to resist any injurious strains is the tissue of the directivity of life.

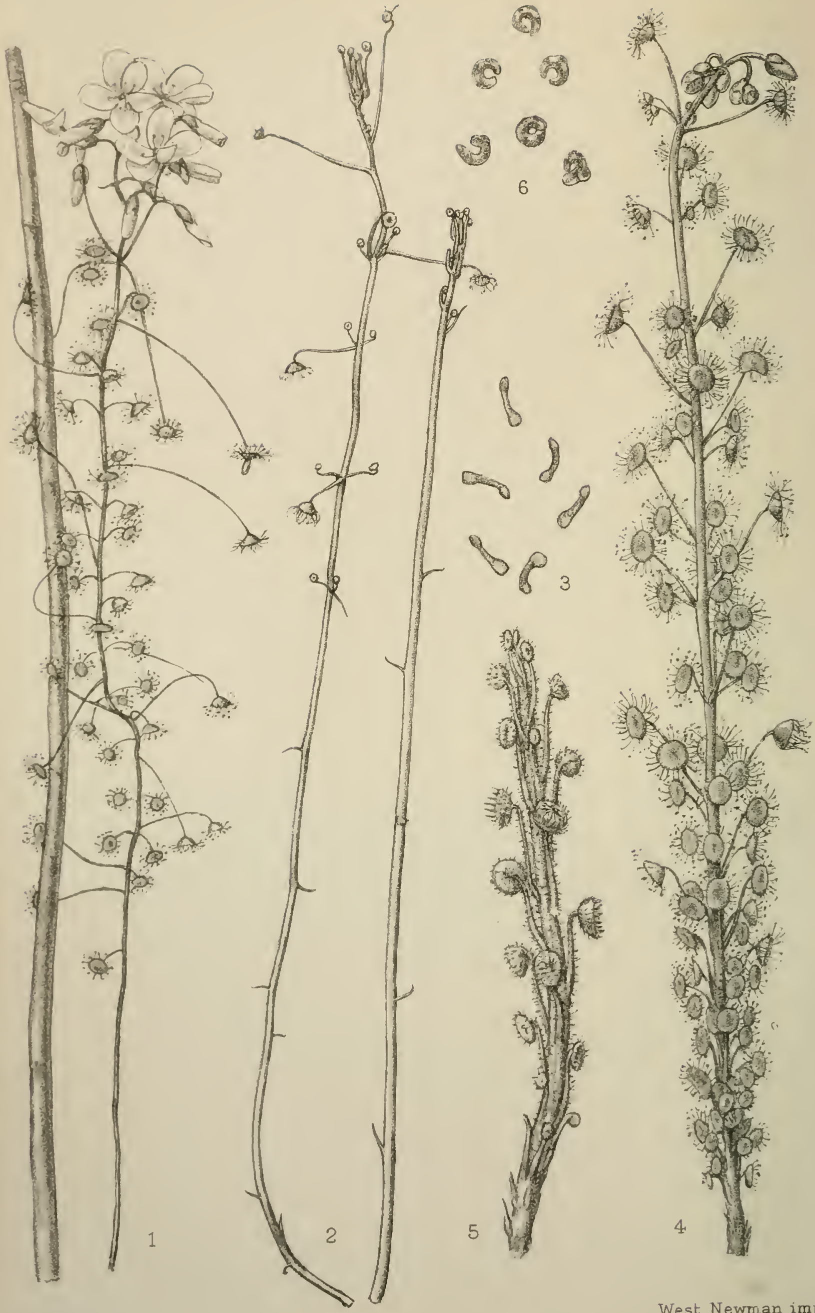
At the same meeting Miss Nellie Bancroft contributed a paper "On some Indian Jurassic Gymnosperms." The fossil plants under consideration are of Liassic age, and come from Amrapara in the Rajmahal Hills in Bengal. The types represented are Gymnospermous, and include examples of *Brachyphyllum Mammillare*, *Benstedtia*, coniferous wood, small bilateral seeds, and Cycadean stems, leaves and fructifications. With regard to the Cycadophyte remains, stems and fructifications of Williamsonian type are associated with foliage which may be considered as identical with the English fronds *Williamsonia Pecten.* Portions of *Dictyozamites falcatus* fronds are also present. There are, however, no indications of actual attachment of leaves or fructifications with the stems. The vegetative organs show a combination of recent and fossil Cycadean characters. Externally the stems resemble those of recent "armoured" Cycads, the leaf-bases being separated by ramental hairs, instead of the scales usually found in the fossil forms. The single compact woody zone of the Indian specimens, with its narrow medullary rays, is a characteristic feature of the fossil stems, differing considerably from the looser structure of recent Cycadean wood, formed in certain cases from successive cambiums. The Indian wood, however, shows multiseriately-pitted tracheides like those of recent Cycads, instead of the scalariform type usually occurring in the fossil stems. Like these, the parenchymatous ground-tissue has numerous secretory sacs rather than the gum-canals of the living forms. The "closed" arrangement of the vascular bundles of the leaf-bases and rachises is similar to that seen in the American fossil Cycads, as contrasted with the open or omega type of arrangement in most recent genera. Both types of frond amongst the Indian material are Cycadean in general plan, agreeing with such living forms as some of the Zamias which show palisade mesophyll, in the possession of which there is also agreement with *Cycadeoidea ingens.* In the structure of the xylem and medullary rays, and of the leaf-bases with their ramental hairs, the Indian stems are exactly similar to the axis of Prof. Seward's Scottish *Williamsonia* fructification. The Williamsonian fructification amongst the Indian types seems to agree, so far as evidence is available, in general characters and arrangement of parts with other Williamsonian and Bennettitean forms. The structural evidence obtained, in conjunction with the external morphology of the specimens, supports the already accepted idea of a uniform Mesozoic Flora.

The November number (vol. ii. no. 3) of the *Journal of Genetics* (Cambridge University Press, 10*s.* net) contains a detailed account of the experiments, in the course of which about 10,000 specimens have been examined, that have been carried on by Dr. A. H. Trow for the last six years on the inheritance of certain characters in *Senecio vulgaris* and its segregates. Dr. Trow finds that the Groundsel includes many segregate or elementary species, of which twelve "have been cultivated and maintained pure and true to type for at least several generations. Six of them have been studied in detail, and are distinguished by more or less descriptive names—*præcox*, *erectus*, *multicaulis*, *latifolius*, *genevensis*, and *lanuginosus*"—the last being radiate, the remainder non-radiate. "*Lanuginosus* was obtained from the Channel Islands, *genevensis* was collected in the vineyards near Montreux, and the others were found in the neighbourhood of Cardiff." The paper, which is of great interest and importance, is illustrated by four plates from photographs of the principal forms. Drs. Keeble and Frankland Armstrong have in the same number a paper on "The *rôle* of oxydases in the formation of the anthocyan pigments of plants," based on observations on *Primula sinensis* (of various flowers of which a coloured plate is given) and *Dianthus barbatus*. The Journal is beautifully printed.

Penicillium glaucum, the blue-mould, is one of our most familiar fungi and to most botanists represents the "green" *Penicillium* species which have been studied in great detail by Richard Westling (*Ueber die grunen Spezies der Gattung Penicillium.* Arkiv für Botanik, ii. n. 1, Upsala). He obtained material from decaying fruits, cheese, &c., and has made artificial cultures on different media. He has discovered a great many additional species, and gives us diagnoses of forty-four which he considers well-established, as they remained unchanged in the different conditions to which he subjected them. He found that *Coremium* formation, in which the conidiophores grow in compact, stalk-like groups, was not the result of any special nutrition, but that it was a character constant in certain species and therefore of diagnostic value. He relies largely on spore characters in the determination of species, as they are unaffected by external changes. The genus *Citromyces* has been included by Westling in *Penicillium*, as he finds connecting forms between the two genera. The historical and biological notes will prove to be of service in the study of other groups as well, and enhance the value of the monograph. Most of the species are illustrated in the text.—A.L.S.

We understand that the *Scottish Botanical Review*, which completed its first volume with the number for October, will not be continued.

We regret to announce the death, on December 13, of the Rev. John Gerard, S.J., of whom a notice will appear in our next issue.



P. Highley del. West, Newman imp.

1-3 Drosera macrantha. 4-6 D. stricticaulis.

DROSERA MACRANTHA AND *D. STRICTICAULIS.*

By Oswald H. Sargent.

(Plate 523.)

The following notes are founded chiefly upon field observations made during the last five years.

Drosera stricticaulis has hitherto been classed as a variety of *D. macrantha*; and it was to determine the true status of the former that my observations were commenced. I am now satisfied that it is entitled to specific rank, and proceed to give my reasons, but will first tabulate the chief morphological differences between the two forms:—

	D. macrantha.	*D. stricticaulis.*
	A climber.	A rigid herb.
Stem	Thin, wiry, glabrous near base, where it bears only scattered scales.	Rather thick, herbaceous, hairy throughout, leafy to base.
Basal Scales	Glabrous, widely scattered, flattened, subulate, acute.	Hairy, rather crowded, linear, truncate, flat.
Petioles	Descending, or (rarely) horizontal.	Ascending.
Laminæ	Horizontal, facing downwards, yellow-green.	Vertical, facing outwards, bright green.
Flowers	Odour aminoid (?): petals white.*	Odour terpinoid (?): petals pink.
Ovule	Linear, wingless.	Linear, with crescentic wing.
Seed	Angular-cylindrical with bulbous ends, straight or slightly curved, smooth and uniformly black.	A broad band much flattened laterally, curved dorsiventrally usually into a complete circle, somewhat wrinkled, with medial longitudinal furrow on each side, black with pale, horny-looking hilar end.

The physiological and minor morphological differences will be pointed out in the life-history sketches which follow.

Soon after the winter rains have commenced (about May), on careful search in its haunts, *D. macrantha* will be found as a slender ruddy stem, with a closely appressed tuft of leaves at its top. The earliest appearance is a small cone formed by one whorl, or quasi-whorl, of slightly imbricate scales arched protectively over the plant's apex; but without elaborate arrangements beforehand this is not likely to be found in the bush.

Two or three weeks after its emergence from the ground, when the stem has attained a height of about six inches, the petioles commence to spread out. The unfolding of the leaf is rather complicated. In the bud the filiform petioles are erect and stand close against the stem, the circular shield-like laminæ, which are attached by the centres of their backs to the apices of the petioles, are vertical and face inwards, and the tentacles are tightly inflexed, so that they are entirely within the hollow lamina. As the stem elongates the petiole gradually bends away until it becomes horizontal or inclined downwards. Simultaneously by a movement of the petiole just below its apex the lamina is carried completely over, so that when it comes to rest (at about the same time as the petiole does) its face is towards the earth. Still a third motion proceeds almost simultaneously with the other two; as soon as the petiole has moved a little away from the stem a few tentacles of the outer row of the then upper edge of the lamina unfold, and are soon extended in the plane of the rim. These movements are all illustrated in Plate 523, fig. 2.

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* See Addendum.

At this stage of its life the plant sways and gyrates in the gentlest breeze. If in its gyrations its tentacles come in contact with a twig, tree-trunk, the horizontal wire of a fence, or even a flimsy straw (the swaying stem of another example of the species is not rejected), they immediately take firm hold—it is remarkable how firmly they adhere even after only momentary contact. Having caught hold, the tentacles bend outwards until they lie in close contact with the back of the lamina; their apical halves then bend forward sharply, and ultimately lie upon the lower halves. The final position is: the lower half of the tentacle is pressed close upon the lamina, and the upper half is pressed closely on the lower half (fig. 1). The advantage of this arrangement is obvious: the plant is fixed to its support by spring attachments. When the movement of the lamina is complete, these attachments stand upon its inner edge, next the axis of the plant. Being centrally attached, the lamina itself has considerable freedom of motion. In clinging to its support by the inner edge of such a lamina the plant secures, I think, the maximum benefit from its spring attachments; I feel certain that attachment to the outer edge would mean considerably more risk of an occasional dead pull. The perfection of the arrangement is remarkable, and might well be thought to have been developed especially to assist the plant in climbing; but the laminæ and tentacles of *D. stricticaulis* behave similarly, and will hold on to objects (a neighbouring tree-trunk, *e. g.*, is often so held), though the plant is not a climber.

I see no reason for supposing that this latter species has arisen from *D. macrantha*, and inherited from it the tentacle movements. My impression is that both species have arisen independently from some older form. It seems probable that *D. macrantha* had practically all the machinery for climbing at the start; in other words, the perfection of the arrangement is largely fortuitous. I say largely fortuitous, because I think some of the movements have become more definite and intense in *D. macrantha* than in *D. stricticaulis*; but there are several non-climbing allies of these species, which I must fully examine before I can speak definitely.

The tentacles which unfold first stand at the morphological apex of the lamina; the others expand when the lamina comes to rest. All of the marginal row bend back till they touch, or nearly touch, the back of the lamina in the course of unfolding. I see no reason for this strong reflexion, from which they return gradually, and finally come to rest approximately in the plane of the rim. This applies to the first few to unfold, if they do not secure work as climbing organs. The leaves which cling to supports catch and digest insects as freely as the leaves devoted entirely to assimilation.

The plant soon becomes too top-heavy to stand erect without support; so, if it fail to find one, it is compelled to lie prostrate. In such a case the apex turns upwards, continues to elongate (making a fresh erect stem, so to speak, some little distance from the first) and search for a support, which the plant may sometimes attain its full length (two feet or more) without finding. When this happens, only a short portion of the stem bearing the inflorescence will be found erect at the flowering season.

The mature lamina hangs horizontally facing the earth. Positive geotropism seems to be the directing agent; for, if a stem be bent away from the vertical, the young laminæ come to rest normally with relation to the earth, but at an abnormal angle with the petiole, or lamina and petiole together take up an abnormal position with relation to the stem. Mature laminæ are fixed in position, relatively to the rest of the plant, notwithstanding that their petioles are flexible.

The only response the laminæ show to light is a reddening of their more brightly lighted sides. The apparent absence of phototropism surprised me not a little, so I made several experiments on plants in pots, but completely failed to detect any movement of any part of the leaf in response to light incidence. The young shoot-tip is strongly positively phototropic.

Round York this species comes into bloom early in August. The inflorescence is a corymb of cincinni. The flowers are pure white and beautiful, even apart from their surroundings; but when, as often happens, the plants grow amongst fairly dense subscrub on "sand plains" a scene of great beauty presents itself at flowering time. The corymbs are reared a few inches above the supporting bushes, and so well does the dull green background set off the snow-white blossoms, whose beauty is still further enhanced by the glistening tentacles on the leaves below them, that the sight is one never to be forgotten.

The flower is strictly ephemeral; the petals unfold soon after 9 a.m. and close up just before sunset (or about 5 p.m.) never to open again. Smelt from a few inches distance—as far from the flower as the human nose can detect—the odour is faint and mildly pleasant; but if a strong sniff is taken close to the blossom it is quite disgusting. It recalls some definite compound, but I have not yet succeeded in recollecting what; there is a suggestion of ammonia, so I have set it down in my table as "aminoid (?)."

Soon after the flower opens the anthers dehisce. The valves roll back and each anther becomes a golden fusiform rod, rough with sticky pollen. The filaments are inclined outwards almost parallel with the petals, so that the anthers stand well beyond the utmost fringe of the feathery styles in all the plants I have yet examined. Some photographs taken by a friend at South Perth show the anthers within the periphery of the styles. The styles—three split up dichotomously into innumerable branches—form a downy-looking tuft upon the deep green globular ovary. The blossoms unfold, several simultaneously, at intervals of two or three days. The flower is without nectar. Though I have in the aggregate spent many hours among the plants in bloom, I have not yet seen a single flower visited by an insect. I believe, however, that the flower is entomophilous, for which belief I will give reason later on.

Flowering is over early in September, and fruits are ripe early in October. Then the aerial part of the plant vanishes as if by magic; what becomes of it I have not yet ascertained. In October 1910 I carefully examined altogether thirty-three plants in three different localities about five miles apart at the angles of an equilateral triangle. They had borne between them nine hundred flowers, and produced eighty-three fruits (9·23 %). The highest number of flowers borne by one plant was ninety, and the lowest two.

I will now briefly outline the annual life-history of *D. stricticaulis.* This species grows in clayey soil where the ground is sopping wet during the growing season. In this it differs from *D. macrantha,* which usually occurs on sand, but seems quite at home in almost any soil, wet or dry. In the summer months this same ground gets very dry—dust dry, in fact. So the plant is exposed to great extremes of moisture conditions every year of its life. Now, though the ground gets wet soon after the commencement of the winter rains (about May), the plant remains beneath the surface till early in August. It first appears as a thick green tuft of leaves closely appressed with tentacles involute (fig. 5). The stem elongates rapidly. It has attained full height (about one foot) and commenced to bloom early in September (fig. 4). Its subsequent history differs but little from that of *D. macrantha.*

The flowers, borne in corymbs of scorpioid cymes, are pink, varying in shade, but usually bright rose. Individually the flowering plant is, I think, more beautiful than *D. macrantha,* but collectively I have not seen an effect produced by it even approaching the splendour of *D. macrantha* plants in full bloom. Its surroundings detract from rather than enhance its beauty; it usually grows under the shelter of "Jam Gum" trees (*Acacia acuminata* Benth.) in places devoid, or nearly so, of under shrubs.

The ephemeral pink blossom opens about 9 a.m. and closes at sunset. It exhales a faint but sweet somewhat lemon-like odour, which becomes stronger in still warm air, but remains pleasing and unaltered in character. The floral structure is closely similar to that of *D. macrantha*; but the stamens are erect and the anthers always well within the periphery of the styles; usually they connive and form a cluster in the centre of the blossom. Nectar is wanting.

In September, 1910, I saw a flower visited by a "hover-fly." I watched carefully, and saw that the insect was greedily devouring pollen. Its legs frequently brushed against the anthers and once plunged in amongst the feathery style-segments. This observation is merely suggestive and not conclusive; but I believe that hover-flies are the chief, if not the only, pollinators.

In 1910 I examined altogether thirty-seven fruiting plants in two localities about five miles apart. They had borne between them four hundred and three flowers, which yielded one hundred and fifty-three fruits (37·96 %). The highest number on any one plant was twenty-nine; the lowest number was two.

The remaining information I can best deal with by taking the two species together. The organs, which, following the *Flora Australiensis*, I have called basal "scales," appear to be phyllodes—petioles functioning as leaves, for quite frequently a fragmentary lamina with a few tentacles appears at the apex of a "scale." They differ from orthodox phyllodes in one point: they are *dorsiventrally* instead of laterally flattened. I have adhered to the term "scales" in my table, because it has been accepted by systematists, and in a general sense the organs in question certainly are scales. That they are so different (see table) in the two species under discussion is remarkable, because *D. Huegelii* Endl., *D. heterophylla* Lindl., and several other species not considered closely allied to *D. macrantha*, have basal scales practically not to be distinguished from those of that species. This being so, the marked difference in this case is strong evidence, it seems to me, in favour of the specific distinctness of *D. stricticaulis*. The difference seems not due to environment, as a species (*D. Neesii* Lehm.?) which grows in very wet soil on the edge of running water has scales precisely like those of *D. macrantha*. I think the primary function of these scales is protection of the terminal bud during the earliest stages, but they persist during the life of the stem and are greenish; so doubtless they contribute their small quota to the nutrition of the plant.

The colours of the aerial parts of the plants and their rates of growth are related to the time at their disposal. In *D. macrantha* these parts have a golden or ruddy hue and grow slowly; the plant has ample time. In *D. stricticaulis* they are green and grow rapidly; this plant has but a short period of vital activity, scarcely more than half that of its ally. The tentacles of *D. macrantha* are strong-looking, with deep red stalks, thus differing markedly from those of *D. stricticaulis*, which are pale-stalked and of a delicate ethereal appearance. The sticky secretion flows more freely from the leaves of the latter species, but I do not know whether it is the more effective as an insect-catcher on that account. I have made no count of the number of insects caught by either species.

In both plants in the axil of each leaf there are two organs exactly similar to the leaf except that the petioles are shorter.

They extend right and left of the primary petiole. These so-called "stipules" arise *within* the axil, and show no connection with the leaf base, their vascular bundles being independent branches of the cauline bundle which supplies a branch to the main leaf. Finding that short branches frequently occur in the lower axils of *D. heterophylla*, it struck me that the organs under discussion might be the two lowest leaves of suppressed branches. They seem, however, to arise from opposite sides of the same node, whereas normal leaves are alternate. Diligent search has failed to discover a branching *D. macrantha*: but I have found several specimens of *D. stricticaulis* with short branches in the lower axils. In these the two doubtful organs remain in their usual position in the axil, and the branch bearing alternate leaves arises between them. I think it most probable that they are axillary leaves *sui generis*. Their function seems to be to increase the leaf area. They can scarcely be related to the climbing habit of the plant, because they are as well developed in the non-climbing *D. stricticaulis* as in the climbing *D. macrantha*, and climbing does not put any of the leaves of the latter out of use as assimilatory organs.

Pollination I cannot adequately deal with at present; a few notes must suffice. I believe pollinophagous flies are the pollinators of both species. In 1910 I observed many hover-flies, of the species which I saw visiting *D. stricticaulis* earlier in the year, busily devouring the pollen of an undetermined *Drosera*,* whose pink flower looks much like that of the last named, though its odour is different, more resembling that of *D. macrantha*. After watching the flies I concluded that they were efficient pollinators. These flies visit many garden flowers in search of pollen. Colour and odour seem matters of indifference, so there is reason to believe that the flowers of both the species under consideration would be freely visited should the fly be about. In our garden in 1910 the fly became more plentiful as the season advanced. This seems significant, in view of the fact that *D. stricticaulis* produced a higher percentage of fruit than the earlier-flowering *D. macrantha*. In this connection I have some interesting figures. In the locality about two miles east of my home the flowers of *D. macrantha* examined yielded 3·66 % of fruits (twenty plants, five hundred and seventy-three flowers), and those of *D. stricticaulis* 26·95 % (fourteen plants, two hundred and thirty flowers). In the locality three miles west of my home *D. macrantha* produced 21·48 % of fruits (six plants, two hundred and forty-two flowers), and *D. stricticaulis* 52·60 % (twenty-three plants, one hundred and seventy-three flowers). Flowering commences in the latter about a fortnight later than in the former place. These facts seem to indicate that later flowering plants stand a better chance of pollination; but the relative importance of locality and other factors being unknown to me, I refrain from pressing the point. The feathery styles suggest wind-pollination; but the pollen is rather scanty and moist, and is not blown from the anthers even by a strong wind.

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* [A specimen of the plant referred to has been sent to the British Museum. In the dry state it seems to differ little, if at all, from *D. stricticaulis*, but the seeds are those of *D. macrantha*. It is probably a hybrid between the two species.—S. M.]

I have frequently wondered why the flower of *D. macrantha* is white. A possible reason has occurred to me. I judge that of all colours (not even excepting green—though considering its immense importance to plants it is scarcely pertinent to include it in this connection) white may be produced by plants with the minimum of expenditure; a flimsy aqueous tissue, well aërated, is all that is required, and the petals of our *Drosera* are of such tissue. A coloured petal must contain, in addition, some colour substance. Now *D. macrantha* has survived by reason of the strict economy it practises; its stem is as slender as possible, and its leaves, in addition to their normal function of assimilation, serve as climbing organs. What wonder, then, if equally rigid economy obtains in the flower, the most expensive portion of the plant? The flowers vary in size and number in accordance with the plant's state of nutrition or vigour. The plan seems to be to produce as large a number of flowers as possible, even at the cost of some loss of attractiveness; and if the blossom must be ephemeral, this is, I suppose, the best plan.

My census figures show that *D. stricticaulis* is far more successful than *D. macrantha* in securing pollination. I have not previously taken a census, but I have yearly noticed that the latter is a "shy seeder," while the former fruits freely. So far as I can judge, 1910 (when my census was taken) was quite an average year with both species. Of the thirty-three *D. macrantha* plants fourteen (two hundred and ninety-five flowers) produced no fruit whatever, while of thirty-seven *D. stricticaulis* only five (twenty-four flowers) met with a similar lack of success. In both species the fruits split septicidally into three elliptical flimsy chartaceous black valves, each a boat-shaped dish full of seeds. These valves diverge as far as the persistent shrivelled corolla will allow. In the course of its growth the fruit splits the base of the corolla, so that ample openings are provided for the egress of the tiny seeds. These look like worthless chaffy scales, rather than specks of latent life. They are scattered by the wind. They germinate in about six weeks at the ordinary winter temperature (about 60° F.). There is no perceptible swelling. A tiny caulicle emerges and a short root is developed; then a slender flat arm terminated by a tiny tightly-clenched hand appears; soon the finger-like tentacles expand, and the baby leaf is ready for work. The cotyledons remain within the seed-case. The young leaves of both species are spathulate, the flat almost linear petiole expanding at its apex into a nearly orbicular lamina. The latter is not peltate with centrally attached petiole as in the adult form. Even in the early stages the seedlings of *D. stricticaulis* look more green and vigorous than those of *D. macrantha*. I raised a few seedlings of both in 1907; these went to rest at the end of spring, and their pots were left dry till the advent of the 1908 wet season;

both then received identical treatment side by side. One plant of *D. macrantha* quickly made its appearance, and about three months later (early in August) a solitary *D. stricticaulis* showed above ground. Unfortunately both these plants died during the year (1908). From a series of seedlings of *D. stricticaulis* found growing wild, I infer that the plant assumes the adult form in the third or fourth year of its life. The aerial plant is previously a rosette of spathulate leaves: the adult form is assumed abruptly.

My object in undertaking the work which has supplied material for this paper was chiefly to ascertain whether or not *Drosera stricticaulis* is entitled to specific rank. I believe I have established its title, and therefore append a diagnosis; but first I wish to make a few concluding remarks.

A careful study of the behaviour of the tentacles should yield some interesting results. While I am not satisfied that contact with non-nitrogenous matter causes reflection, I have so far obtained no evidence that it causes inflection; clean grains of sand, *e. g.*, placed upon the heads of tentacles cause no movement whatever in all the experiments I have yet made. As to the value of colour to the flower, I have a scrap of evidence that it might be possible by a rather neat experiment to colour a *D. macrantha* flower pink. The basis of my idea is this: in September, 1907, I found a *Drosera* with pale pink flowers. It seemed to be a hybrid between my subject species; the plant, which was a climber, was growing where both supposed parents were plentiful. Its stem was stouter than usual in *D. macrantha*, and more resembled that of *D. stricticaulis*. The leaves were roughly intermediate between those of the two "parent" species, but beginning from the base of the stem they alternately more resembled first those of *D. macrantha*, and then those of its ally. The basal scales were much like those of the first species, and the foliage just below the inflorescence closely approached that of the latter. The flower and ovules were intermediate. Though I have kept a sharp look-out I have not yet found another form like the above. My suggestion is that, by crossing, a pink-flowered form resembling and flowering synchronously with *D. macrantha* might be obtained. If colour and odour are separately inherited it would then be possible to test the relative value of each in attracting insects. I do not know what odour my supposed hybrid had; indeed, at the time I found it I had not observed that *Drosera* flowers possess any scent, so faint and elusive is it.

Drosera stricticaulis, sp. nov. Herba caulescens, caule rigido terete piloso-glanduloso internodiis basi abbreviatis ± 3 cm. longo; cataphyllis linearibus truncatis piloso-glandulosis; foliis petiolis filiformibus suberectis ad basin caulis ± 4 mm., ad apicem 18–25 mm. longis insidentibus concavo-orbicularibus verticalibus ± 5 mm. diametro; floribus rosaceis; staminibus erectis; seminibus complanatis circularibus vel saltem hippocrepiformibus nigris cum hilis pallidis.—*D. macrantha* Endl. var. *stricticaulis* Diels in Engler, *Pflanzenreich*, Heft 26 (iv. 112), p. 119.

A *D. macrantha* præcipue differt caule rigido erecto, cataphyllis pilosis nec glabris, seminibus complanatis circularibus nec rectis vel parum curvatis.

My description is based upon a study of many specimens. My numbers 719, 720, and 721 in Herbb. Mus. Brit., Melbourne, and Sydney respectively well represent the species.

ADDENDUM, April, 1912.

The above paper was written early in 1911, and is a record of my observations up to the end of 1910. While further observations have not led me to reverse any opinion I have expressed, they have added a little to my knowledge of the plants.

(1) In September last my brother Philip called my attention to some *D. macrantha* plants with pink blossoms, most of them paler in shade than *D. stricticaulis* flowers. They were growing in the Talbot district, about twelve miles south-west of York. As nature had thus performed for me an experiment I much wished to make, I made careful arrangements for estimating the relative proportions of pink flowers and white ones (they were growing close together in the same locality) securing pollination; but owing to an unfortunate accident my labour proved fruitless. *D. stricticaulis* was plentiful not far away, but apart from its colour I saw no reason for suspecting the pink-flowered *D. macrantha* to be a hybrid.

(2) Through the kindness of Dr. A. Morrison, of Perth, W.A., I have had the privilege of perusing Diels's Memoir on the *Droseraceæ.* The figure therein given of *D. macrantha* admirably represents the plant as I know it, except that the attitudes of the leaves are not quite life-like. Dr. Diels is under the impression that the leaves, acting as climbing organs, give up assimilatory work (pp. 15, 35). Such is not the case. In September last I carefully examined all the clinging leaves on twelve plants of *D. macrantha*, taken at random in several localities: of the one hundred and twenty-five leaves examined one hundred and fifteen contained insect remains. In no case did a plant have all its clinging leaves free from insects; but in seven cases all such contained insect remains. In one instance one of the "axillary pair," which also had caught insects, was acting as climbing organ, the primary leaf being free. I note with satisfaction that Dr. Diels regards the axillary leaf-like organs as secondary leaves, as I came to the same conclusion independently.

(3) Horticultural experience inclines me to believe that soil temperature begins to rise about August. It has struck me that this probably accounts for the time of the appearance of *D. stricticaulis.* On this point I am making observations, which I hope to make known in due course.

I wish to express my indebtedness to Professor W. B. Bottomley, who first directed my attention to Droseras, and to Mr. Spencer Moore, whose keen interest, especially in climbing Droseras, has kept alive and strengthened my own. But for these gentlemen the present paper would probably never have been written; and I should have been considerably poorer by the lack of some most instructive botanical experience.

EXPLANATION OF PLATE 523.

Figs. 1–3. *D. macrantha* Endl. 1. Adult plant showing its attachment to a supporting stem. 2. Young plant showing the true scales, the phyllodes or basal scales, and the successive movements of the unfolding leaves and their tentacles. 3. Ripe seeds (× 6).

Figs. 4–6. *D. stricticaulis* O. H. Sargent. 4. Adult plant. 5. Young plant at a stage corresponding to that of *D. stricticaulis* shown in fig. 2. 6. Various forms of the ripe seeds (× 6). Figures nat. size unless otherwise stated.

MYCOLOGICAL NOTES.—II.*

BY W. B. GROVE, M.A.

PUCCINIA CARICIS. This is the best type to take for a student commencing the study of the Uredineæ. If objection is made that it is not sufficiently common everywhere, it may be replied that it can easily be introduced wherever it is wanted. The following is a record of an experiment to support this contention; it also serves to throw light upon the question of spore-dispersal.

Near Birmingham there is one locality in which this species has existed for the last thirty years; it appears in great abundance without fail every year. The place is a shallow pool in a roadside spinney, filled with *Carex paludosa* (*acutiformis*) and surrounded by a quantity of nettles. On the other side of the road, not more than one hundred yards away, in a similar spinney, is another pool, provided also with *Carex* and nettles, but here the *Puccinia* had never been seen in any of its stages, and since the place was visited regularly by a class of students it is apparently certain that the fungus had never occurred there during all these years. One can only surmise that the thick belts of trees and bushes, one on each side of the road, intervening between the pools, had hindered the conveyance of the spores. About three hundred and fifty yards away in the exactly opposite direction is another similar pool, surrounded by abundance of nettles, but having no *Carex*; here, also, the *Puccinia* (of course in its æcidial stage) had never been seen. Let us call these pools A, B and C; B lies to the west of A, and C to the east; the trees are so placed that B is open to the west and A to the east, but C is surrounded by trees on all sides.

In January of this year (1912) a bundle of about five hundred dead *Carex* stems and leaves, richly covered with sori, was removed from A and laid down by the edge of B, right in the midst of a part where the dead stems of nettles were abundant. In February a similar bundle was placed about three yards to the west of another bed of nettles, then just showing, also by B. When the spot was visited on April 27th, the nettles round the first bundle were covered with a rich abundance of the æcidium, which extended in a north-easterly direction to a distance of about three feet, and in other directions less. Near the second bundle no æcidium could be observed; the nettles round A were thickly covered with it.

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* See Journ. Bot. 1911, 366.

On this same day (April 27th), a third and similar bundle of last year's *Carex* was conveyed from A to C and laid amidst a bed of nettles, which at this time were well above ground. The pools were examined again, after a rainy period, on May 27th, when at A and round the *first* bundle at B, a second crop of æcidia (arising from a second outburst of basidiospores), was seen to be just making its appearance; on visiting the *second* bundle at B, a few patches of spermogones and æcidia were visible on the nettles nearest in an easterly direction, about three yards away, but nowhere else. On reaching C, at first sight it seemed as if the experiment had failed; the tall nettle-stems around the bundle showed no signs of æcidia, but on looking underneath it could be seen that a few stems had the leaves affected quite close to the bundle, to a height of about four or five inches only from the ground. In this case the effect of air-currents was hindered both by the trees and by the nettle-stems which grew around in dense array.

Since the prevailing winds are westerly, it was obvious that they could not blow the basidio-, æcidio-, or uredo-spores from A to B, and the easterly winds were rendered ineffectual by the belts of trees. The westerly winds could have blown the basidiospores from A to C, but did not do so effectually on account either of the distance or of the surrounding trees.

There is another pool, D, about three hundred yards to the south-east of A, having abundance of both *Carex* and nettles, and densely surrounded by trees. Here nothing has been done, and the nettles this year, as in all previous years, were perfectly devoid of infection.

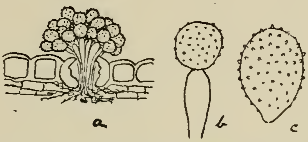
From these facts two inferences can be drawn: (1) That the chief means of distribution of the spores of the Uredineæ is the wind, but the efficiency of this agent can be reduced to very narrow limits by other factors, *e.g.*, in the case of B perhaps not one basidiospore in a billion reached a nettle-leaf and germinated successfully; and (2) That one can introduce *P. Caricis* into any suitable locality, three things being given—*Carex*, the common nettle, and a bundle of infested leaves of the former. *C. paludosa* is the best, but *C. hirta*, *C. pendula*, *C. Pseudocyperus*, and *C. riparia* will also do. The month of January appears to be the best time for the operation, which presents this advantage compared with some others of like kind, that the two plants affected by it are both common, and that no agriculturist or horticulturist can object to their infection, since both of them are useless or injurious.

Phoma pigmentivora Mass. In the *Kew Bulletin* for 1911 (p. 325, with plate) is a very interesting account of this new fungus, which lives upon the oil of white paint. I have since found the fungus (which I had never seen before) at several places where conservatories had been newly painted, and have had it sent to me from other towns. These specimens, after being examined microscopically, were put away in my herbarium. A curious sequel followed. In May the iron bath, in a room about twelve yards away from my study table, was newly painted with, I suppose, the ordinary white bath-enamel. It happens, by good fortune, that the bath is badly made, so that from a portion of the lower surface (about half a square foot in area) the water escapes very slowly. On this surface, and only on this, there appeared at the end of May a number of pinkish or rosy-purple patches, which beneath the microscope were seen to consist of mycelium, and in June these were covered with the pycnidia of the *Phoma*. The spores must have been carried accidentally to the bath-room, and there found the requisites of growth—warmth, continual moisture, and a newly painted surface. The mycelium grew freely in the paint, and could be scraped off in large quantity.

Uromyces Loti Blytt. Since writing the note on this species (Journ. Bot. 1911, p. 367), I have received from Mr. C. Crossland some plants of *Lotus angustissimus* (collected in 1907 by Dr. C. C. Vigurs near Newquay, Cornwall), on which the same *Uromyces* occurred. The teleutopores were, however, in this case less strongly marked with the lines of warts: the difficulty of seeing them may have been partly due to the age of the specimens, since markings of this kind are often best seen on fresh material. But it is no doubt also due to the variability of the species in this respect; Fischer remarks that he found striped and warted teleutospores in the same sorus. In the spores from *L. angustissimus* the markings were rather of the nature of short, distinct, irregularly placed lines, while on *L. corniculatus* they frequently formed long anastomosing ridges, though also some were of the same character as in *L. angustissimus*.

Hemileia Phaji Syd. Sir Frederick Moore has sent me from the Botanic Gardens, Glasnevin, Dublin, some slides of a Uredine on *Phajus Wallichii*; these were supposed to be the same as *Uredo Lynchii* Plowr. on exotic *Spiranthes* at Kew Gardens (British Ured. p. 259), but are seen on examination to be very different. They show every character of a *Hemileia*, and are no doubt identical with *H. Phaji* Syd. = *Uredo Phaji* Raciborski. Herr H. Sydow informs me that *Hemileia Oncidii* Griff. et Mau. is a very similar species, and Sir Frederick says he has found a similar Uredine to that which he sent me, on *Oncidium varicosum*, *O. Forbesii*, as well as on *Lycaste Skinneri* and *Epidendrum vitellinum* at the same Gardens. These may be the same, or more probably distinct, species: only the uredo stage has been found, and it appears at Glasnevin and elsewhere on freshly imported plants, although it may spread to a small extent under glass in this country. No doubt close examination would show that several Uredines are imported on orchids in this way.

In the specimens of *H. Phaji*, as shown by the slides, the hyphæ emerge from the stomata in little fascicles, becoming somewhat clavate upwards, each surmounted by a subglobose and strongly echinulate yellow spore. There are about 20–25 in each fascicle. The spores are echinulate all over; the character which was at first given to the genus, of having one side of the uredospore smooth, is now known to be not of universal application.



Hemileia Phaji Syd. *a*, tuft of spores, emerging from a stoma, × 150; *b*, young spore; *c*, mature spore, × 500.

On comparison with the figure of *Uredo Lynchii*, given by W. G. Smith in Gard. Chron. 1885, p. 693, f. 154, it will be seen that the spores of that species form pustules which burst the epidermis and belong to some quite different genus, at present unknown.

Puccinia Zopfii Winter. This species on *Caltha palustris* bears a close outward resemblance to *P. Calthæ*, but is distinguished essentially by its teleutospores, which are provided with a few, rather distant, minute warts, mostly towards the upper end and rather difficult to see. Moreover, the spores are relatively much broader, more oblong, and not narrowed towards the summit; they are therefore easily seen to be distinct *in shape*, and have a darker colour and shorter pedicels. Both species have æcidia on the *Caltha* in May, but it is not known how these differ, if at all. I first detected this *Puccinia* on specimens sent me from Ireland by Mr. J. Adams, but on examination of others preserved in herbaria it is found to have occurred in Wales, Scotland, Shropshire, Yorkshire, and elsewhere; Mr. J. Ramsbottom has kindly examined the specimens in the Herbarium of the British Museum for me.

Ascochyta Brassicæ Thüm.—This and the two following species were also sent by Mr. J. Adams.

Pycnidia epiphyllous, small, black, prominent, very densely crowded on pale whitish-grey spots, which are roundish, oblong, or irregular, and 12–25 cm. in diameter; sporules fusiform, acute at both ends, straight, uniseptate, 15 × 3 μ.

On living leaves of cabbage, Antrim, 1906.

Darluca genistalis Sacc. Pycnidia about 80 μ diam., black, ovate, slightly and obtusely papillate, collected into little dense, tubercular, subhemispherical, erumpent clusters; sporules fusiform, straight, rather obtuse, uniseptate, colourless, 12–15 × $2\frac{1}{2}$ μ.

On sori of *Uromyces Anthyllidis*, Co. Dublin, September, 1906.

Texture of pycnidia parenchymatous, pale grey below, becoming dark brown, but still translucent towards the apex; sporules without any visible terminal appendages.

Synchytrium Succisæ De By. et Woron. Galls hypophyllous or a few epiphyllous and on the petioles, brownish-black, minute,

$\frac{1}{3}$–$\frac{1}{2}$ mm. diam., gregarious, bursting at the summit. Resting-spores broadly ellipsoid, smooth, 50–80 μ diam., with a thick, brittle, yellow-brown exospore and granular orange-brown contents.

On radical leaves of *Scabiosa Succisa*, Leixlip Station, Co. Kildare, and Magilligan, Co. Derry, end of July and August.

Many of the cells which form the compound gall were filled with the bright yellow resting-spores, several in each cell; a few were found singly elsewhere in the epidermal cells of the host. According to Fischer (Phycomycetes, p. 53) and Schröter, the zoospores are produced from sorus-sporangia on the host plant about August, and enter at once into the epidermal cells of another host plant, either those which become modified to form the walls of the gall, or more rarely elsewhere; there they form their resting-spores as on the Irish specimens.

SWISS NOTES IN 1912.

By H. Stuart Thompson, F.L.S.

It may be worth while to put on record the finding of various curious forms, hybrids and monstrosities, which I gathered in Switzerland, mostly in the Valais, last summer, which was remarkable as elsewhere for its excessive rainfall and cold. Indeed, the damp weather may account for some of the things observed.

First, pale colour forms of a number of flowers were in evidence in various places, though, on the other hand, such a plant as *Sedum album* was as pink as ever I have seen it, especially on a wall at Praz de Fort, in Val Ferret. Pale porcelain-blue blossoms of *Campanula rotundifolia* and of *C. Scheuchzeri* were observed in several places, and pure white *C. excisa* in one of the valleys above Binn, where this very rare species grows. In two valleys it ascends, with intervals, to above 7500 ft., and this *Campanula* seems to enjoy the borders of rocks and stones by mountain paths more than any other habitat. *C. Scheuchzeri* is very variable—usually with five corolla segments, it occasionally has eight or ten, and one was found with a bifid segment. Some very large blossoms found at Binn and Riederalp were almost saucer-shaped, and the same thing was noticed in 1911 on the Col de Balme, between Argentière and Martigny. The hirsute variety of *C. Scheuchzeri* is not uncommon. *C. rotundifolia* is often very large and handsome in the Alps, and apt to be easily mistaken for the last species. Above the Trient Glacier, in July, at about 6700 ft., I found an obvious and well-marked hybrid between *C. Scheuchzeri* and *C. rhomboidalis*.

Other pale forms observed included *Cirsium acaule*, pink, at Riederfurka (6800 ft.); *Carduus nutans*, with beautiful pale pink flowers, close to chalets, near Binn; *Lathyrus pratensis*, with pale yellow petals, under fir trees, near Riederalp; and *Prunella grandiflora*, mauve and white—a fine clump in the Saleinaz Valley.

The usual colour of this handsome weed is a rich purple, like that of *Orchis Morio*, and the bracts and calyx are dark madder-red. I never before saw so much of the unicolor (blue or mauve) variety of *Linaria alpina*, and some of the flowers were pale mauve, with white palate. They were especially fine on the Geisspfad Pass near the Italian frontier, at 7500 ft. Late in August, close to the top of the Eggishorn (9500 ft.), within a few feet of the much frequented path, were many patches of snow-white *Androsace glacialis*, with very few of the ordinary pale pink blossoms; the leaves of these little cushions were entirely obliterated by the white flowers.

In Längthal, Binn, was a good hybrid, *Saxifraga cuneifolia* × *stellaris*, both parents being close at hand in a damp, shady spot. A double *Knautia sylvatica* was not far off. On the moraine of the Saleinaz Glacier, of the extraordinary vegetation of which I have written an account for the *Gardeners' Chronicle*, were quantities of *Listera ovata*, one of which had a double flower on one pedicel. On the same moraine, and also at Champex and Riederalp, were monstrous growths of *Cerastium triviale* with green petals only. On the high ridge above Riederfurka, separating the Great Aletsch Glacier from the Rhone Valley, at about 7300 ft., are numerous pools of water, in several of which are quantities of *Sparganium minimum* Fries, and *Callitriche vernalis* var. *minima* (both kindly determined by Mons. G. Beauverd). There was ice at least half an inch thick on these pools one morning in the middle of August.

Near the picturesque village of Ried, wheat, ash, and pear trees, flourish at about 4000 ft. *Geranium sanguineum* and *Melampyrum arvense* ascend to 4500 ft., the southern grass, *Andropogon Ischæmum* to about 3500 ft., and *Vinca minor* reaches 3000 ft. I also found the *Andropogon* nearly as high in walking up Val d'Illiez to Champéry. Above Belalp and Riederfurka, *Arenaria rubra* can be seen at 7500 ft.

In descending the Eggishorn by the steep rocks direct to the glacier, at above 7800 ft., I came upon beautiful patches of *Gentiana brachyphylla*, a foot or more across, with a few mauve blossoms among them. I had not previously observed this colour-form; but *G. verna* and especially *G. nivalis* are not infrequently found with mauve flowers. The colony of *G. bavarica*, with violet flowers, which I found in June, 1908, and which apparently was the first record for such a colour-form, has extended its area somewhat, and is now found about a mile off in the same part of the Mont Blanc *massif*, at about 7000 ft. Some of the flowers were a very intense violet, almost black; but I find there is a tendency in drying to revert to the normal blue colour.

Near the junction of the Ober Aletsch and the Gross Aletsch Glaciers, at about 6000 ft., I came upon an extraordinary form of *Trifolium pratense*, with heads more resembling those of *T. maritimum*, and with short pale pink corollas. Later, in Herb. Mus. Paris, I saw a very similar plant from the Grenier collection, collected by H. Loret at Gèdre in the Pyrenees, in 1860. It was numbered "61. *Trifolium* — nouveau?" Then at Cambridge, in Herb. Babington, I turned to the type specimens of *T. pratense* var. *parviflorum* Bab., which Mr. Burkill had found "identical with *T. pratense* var. *micropetalum* Lange." I believe the Paris plant and my own, which was divided among *Herb. Boissier*, *Herb. Brit. Mus.*, and *Herb. Cantab.*, are the same. In November, 1900, Burkill read a short, interesting paper on "*Trifolium pratense* var. *parviflorum*" before the Cambridge Philosophical Soc. (Proc. Camb. Phil. Soc. xi. 29).*

Finally, the wet weather probably accounted for the following abnormalities:—*Rubus saxatilis*, runners ten feet long, and rooting at the nodes, below Binn, at 4700 ft.; *Malachium aquaticum*, with shoots four feet long, on a damp shady bank in Längthal, Binn; and *Fragaria vesca*, with four-feet runners, falling over a damp limestone cliff above Bex. In Binnenthal, at the end of August, not a single ripe pod of the very rare *Matthiola valesiaca* was to be seen, though there were two lingering spikes of the pretty lilac flowers, and plenty of seedlings from last year.

POPPY HYBRIDS.

By E. Adrian Woodruffe-Peacock, F.L.S.

Our common poppies may be roughly arranged from the general average of their stigmatic disc rays in the following order:—*Argemone* 4, *dubium* 6, *Lecoqii* 8, *strigosum* 8, *Rhœas* 10, *Pryorii* 11. Though my notes at present suggest that it is never quite safe to argue from one soil or locality to another, yet at any given place general averages from stigmatic rays can be fully depended on.

At a spot which had been freshly prepared for an invasion by throwing sand out of the stream bed early in 1911, I found *Rhœas* and *dubium*, in the proportion of 8 and 5, growing intermixed on the bank of Cadney Beck. Though poppy seed of all kinds is regularly water-carried, it was not till September that I could detect the presence of *strigosum*, and then only in the smallest quantity, approximately 1 to 5000. This season (1912) by the first week in July it was there, too, in fair quantity; roughly in proportion with the others of 8, 5 and 1.

The number of rays in *Rhœas* varied from 9 to 14, a range of 6, in 200 flowers taken at random, and averaged a trifling fraction under 10. In *dubium* the rays varied from 4 to 7, a range of 4, in a hundred flowers, selected in the same manner, and averaged exactly 6. In *strigosum* the rays varied from 7 to 10, a range of 4, in fifty flowers, practically all that were to be obtained that day, and again averaged almost exactly 8.

It is remarkable that though *strigosum* stands half-way between

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* [This paper is reprinted in Journ. Bot. 1901, 235, with an additional note.—Ed. Journ. Bot.]

Rhœas and *dubium* in the number of its average rays, it is exactly like *dubium* in its range of variability. This I have observed in other places.

This was not the only sign of hybridity I noticed in *strigosum*. In a series of fifty plants from one spot the capsules will be found to vary much in length. When one approximates, though it never reaches, to the length of *dubium*, it has always the *dubium* in contradistinction to the *Rhœas* stigmatic rays, both in number and kind. This distinction must be studied in a series of fresh plants to be appreciated. If it is a hybrid (and I know no means of testing hybridity except by analysis, noting the averages of mixed characteristics much as this) it most frequently approximates to the predominant *Rhœas* in type.

On the Beck bank at the same spot *Pryorii* was also present in fair quantity. Its stigmatic rays varied from 10 to 12, and averaged in thirty plants, not flowers, a trifling fraction over 11. Such a narrow range of variation as 3 is most unusual. *Pryorii* has a trifling wider range than *Rhœas* generally. I take it to be an improved energetic variety of the type usually found growing on a slightly richer soil. In one case only, though I looked most carefully, a trifling tinge of purple on the appressed hairs of a *strigosum* plant suggested that a *Pryorii* variety had been one of its parents.

In considering the hybridity of *strigosum*, it is as well to remember (1) that it seems only partially fertile, and (2) that other forms approximately like it exist.

The late Mr. Beeby recorded in this Journal for 1884 (p. 18) one of mixed characteristics between *dubium* and *Lecoqii*. I found another, where the types grew together, on a bank in 1909. This plant had two seeding capsules with 7 rays, and 8 rays on a flowering capsule. Mr. F. A. Lees noted in the *Botanical Record Club Report for* 1877, p. 231 (as *P. Argemone* var. *glabrum*) what looks like a hybrid on the Neocomian east of Rasen. He described it in fruit from fresh specimens as having stem leaves grey and glaucous beneath when young; mature capsules often quite glabrous; and, in conversation later to me, as "a *dubium* like *Argemone*, without bristles or with only one bristle on the capsule." It was more abundant on the spot than type *Argemone* or *Rhœas*. In September, 1904, I took specimens, which answered to this description, on a roadside edge where *Argemone* and *dubium* were both growing. The seeding heads were practically glabrous, but some had one bristle on them in flower.

Since Mr. Reynolds first wrote to me about finding *chelidonioides* (O. Kuntze), of which, *pace* Mr. Reynolds (Journ. Bot. 1912, 348), I never saw a specimen, I have tried very many hundreds of plants of *Rhœas* on old stone heap places and roadside edges; and on August 22nd last, at Manton on sandy limestone on a roadside edge, I took *Rhœas* with slightly yellow sap, which took time to colour, and with 10 stigmatic rays, but in all other respects quite typical. I should judge that this is his variety hybridised again with the type, or, as I am still inclined to think, till further evidence comes to hand, (*Rhœas* × *Lecoqii*) × *Rhœas*.

The evidence of my notes does not end at this point. From the mid sixties to the later eighties of last century *Lecoqii* was a garden plant of light, rich soils. It then had the dark orange sap of *chelidonium*, which took no time to colour. Since it has become more widely distributed on poorer soils, there appears to be a distinct change in the colour of the sap, from the *chelidonioides* type to a light yellow, even taking time to become that in typical *Lecoqii*. No doubt other workers will be able to verify this next season.

Finally, *P. Lecoqii* is now on record for several places in South Lincs. 53, where Miss Stow and I have both found it.

BRITISH FUMARIA RECORDS.

By H. W. Pugsley, B.A.

Since the appearance of my *Fumaria* Supplement last year the examination of British specimens has yielded the following additional records of interest. With the exception of *F. occidentalis* and two cases of confirmation of old records, all the forms are new for their respective vice-counties:—

F. capreolata (v. *Babingtonii*).—58. *Cheshire:* W. Kirby (*Hb. C. Bailey*, confirmation of old record). 65. *N. W. Yorks:* Richmond (*Hb. C. Bailey*).

F. purpurea.—65. *N. W. Yorks:* Richmond, *Dr. St. Brody* (*Hb. C. Bailey*).

F. Boræi.—42. *Brecon:* near Builth, 1902 (*Hb. C. Bailey*). 47. *Montgomery:* Breidden Hills, 1877 (*Hb. J. C. Melvill*, confirmation). 64. *Mid-west Yorks:* Ilkley, 1860 (*Hb. Mus. Manchester*).

F. Bastardi.—1. *W. Cornwall:* St. Ives, 1909 (*Hb. C. Bailey* var. *Gussonei*). 49. *Carnarvon:* Llandudno, 1881 (*Hb. C. Bailey* var. *hibernica*). 50. *Denbigh:* near Ruthin, 1895 (*Hb. C. Bailey*). 87. *W. Perth:* Tullibardy, Clackmannan, *T. Drummond*, 1876 (*Hb. J. C. Melvill*).

F. occidentalis.—1. *W. Cornwall:* Garden ground, Newlyn, *E. G. Varenne*, 1881 (*Hb. C. Bailey*, as *F. confusa*, the earliest known example).

F. micrantha, f. *dubia*.—8. *S. Wilts:* Salisbury, *W. M. Rogers*, 1876 (*Hb. Mus. Manchester*). 14. *E. Sussex:* Battle, *E. Crespigny*, 1886 (*Hb. C. Bailey*).

F. parviflora.—7. *N. Wilts:* Aldbourn, *E. S. Todd*, 1912 (*Hb. Druce*).

The occurrence of *F. Bastardi* var. *Gussonei* at St. Ives, where very fine and typical specimens were obtained by Mr. Bailey, must be attributed, I think, to accidental introduction with agricultural seeds or roots; and its presence in Jersey, and that of *F. paradoxa* and *F. neglecta* near Penryn, are perhaps due to a similar cause. We may, indeed, owe all three plants to early strains of seed potatoes.

A friend of the late Dr. Ralfs recently informed me that he remembered how Ralfs on one occasion, noticing a well-known Mediterranean plant in a cultivated field near Penzance, elicited by enquiries that the stock of that very crop had been actually brought from the Riviera.

NOTES ON SOUTH-WEST NORFOLK PLANTS.

By F. C. Newton.

The following notes I have collected during the last five or six years while studying the flora of the district surrounding Walton, which is the southern part of Watson's west division. The soil is a chalky boulder clay, varying a great deal in consistency and depth, frequently exposing or only covering by two or three inches the underlying chalk. It is fairly well wooded, and in the south passes into the peculiar "brecklands." There are several commons and a good deal of almost undrained marshland. The result is a rich and varied flora.

Three plants called casual aliens in ed. 10 of the *London Catalogue* occur, though *Erigeron canadense* can hardly be regarded as a casual now. The others are *Sisymbrium pannonicum* and *Melilotus indica*; neither have been before recorded for the county. The *Sisymbrium* was brought from Gressenhall in 1911 by Mr. W. Watson, of Chislehurst, and the *Melilotus* I found at Saham, and had sent me from Rockland All Saints.

The woodland flora is not rich, and many common plants are absent, for instance, *Euphorbia amygdaloides*. *Paris quadrifolia* has disappeared from the area during the last twenty-five years. The most interesting plants are:—

Geum urbanum L. × *rivale*.
Daphne Laureola L.
Aceras anthropophora Br.
Habenaria virescens Druce.
Carex sylvatica Huds.
Melica uniflora Retz.
Poa nemoralis L.
Osmunda regalis L.

Aceras anthropophora occurs in a beech-pine wood in the vicinity of Thetford, rather a surprising locality. The same wood a few years ago contained *Ophrys muscifera*.

The fen areas vary somewhat in type, but are fairly constant in flora. Saham Fen is the only one I have noticed with a marked convexity in surface. I am indebted to Captain C. J. Randolph for permission to examine this fen, and to Lionel Robinson, Esq., of Old Buckenham Hall, for allowing me to examine Old Buckenham Fen, which is similar in type, as is Carbrooke Fen. All three are waterlogged meadow-land, dominated in various parts by *Ruscus*, *Cladium Mariscus*, and *Schœnus nigricans*. In the wettest parts of Old Buckenham Fen there are also large areas of *Iris Pseudacorus* and *Carex paniculata*. The following list contains all the distinctive marsh plants I have yet found in these three localities:—

Thalictrum flavum L.
Ranunculus Flammula L.
R. Lingua L.
Aquilegia vulgaris L.
Nymphæa lutea L.
Radicula Nasturtium-aquaticum Rendle & Britten.
Barbarea vulgaris Ait.
Cardamine amara L.
C. pratensis L.
Polygala vulgaris L.
Lychnis Flos-cuculi L.
Stellaria aquatica Scop.
S. palustris Retz.
S. uliginosa Murr.
Hypericum quadrangulum L.
Geranium pratense L.
Rhamnus catharticus L.
Ononis repens L.
Lathyrus pratensis L.
Spiræa Ulmaria L.
Geum rivale L.
Potentilla erecta Hampe.
Parnassia palustris L.
Hippuris vulgaris L.
Callitriche palustris L.
C. stagnalis Scop.
Lythrum Salicaria L.
Epilobium hirsutum L.
E. parviflorum Schreb.
E. palustre L.
Hydrocotyle vulgaris L.
Apium nodiflorum Reichb. fil.
Sium latifolium L.
S. erectum Huds.
Œnanthe fistulosa L.
Œ. aquatica Poir.
Silaus flavescens Bernh.
Angelica sylvestris L.
Peucedanum palustre Moench.
Galium palustre L.
G. uliginosum L.
Valeriana dioica Sm.
V. sambucifolia Mikan.
Eupatorium cannabinum L.
Pulicaria dysenterica Gray.
Senecio aquaticus Hill.
Cnicus palustris Willd.
C. pratensis Willd.
Sonchus arvensis L.
Lysimachia vulgaris L.
L. Nummularia L.
Anagallis tenella Murr.
Samolus Valerandi L.
Menyanthes trifoliata L.
Myosotis cæspitosa Schultz.
M. scorpioides L.
Scrophularia aquatica L.
S. nodosa L.
Veronica scutellata L.
V. Anagallis-aquatica L.
Euphrasia officinalis L.
Bartsia Odontites Huds.
Pedicularis palustris L.
P. sylvatica L.
Pinguicula vulgaris L.
Mentha longifolia Huds.
M. aquatica L.
Lycopus europæus L.
Stachys palustris L.
Polygonum amphibium L.
Rumex Hydrolapathum Huds.
Alnus glutinosa Gaertn.
Salix repens L.
Listera ovata Br.
Epipactis longifolia Rendle & Britten.
Orchis morio L.
O. incarnata L.
O. maculata L.
Habenaria conopsea Benth.
Iris Pseudacorus L.
Juncus bufonius L.
J. squarrosus L.
J. conglomeratus L.
J. subnodulosus Schrank.
Luzula multiflora DC.
Typha latifolia L.
T. angustifolia L.
Sparganium erectum L.
Alisma Plantago-aquatica L.
Butomus umbellatus L.
Triglochin palustre L.
Potamogeton natans L.
P. heterophyllus Schreb.
Zannichellia palustris L.
Eleocharis palustris Roemer & Schultes.

Blysmus compressus Panz.
Eriophorum angustifolium Roth.
E. latifolium Hoppe.
Schœnus nigricans L.
Cladium Mariscus Br.
Carex dioica L.
C. pulicaris L.
C. diandra Schrank.
C. paniculata L.
C. leporina L.
C. gracilis Curt.
C. Goodenowii Gray.
C. flacca Schreb.
C. panicea L.
C. pendula Huds.
C. binervis Sm.
C. flava L.
Carex hirta L.
C. Pseudo-cyperus L.
C. acutiformis Ehrh.
C. inflata Huds.
Phalaris arundinacea L.
Alopecurus geniculatus L.
Deschampsia cæspitosa Beauv.
Phragmites communis L.
Molinia cærulea Moench.
Catabrosa aquatica Beauv.
Briza media L.
Poa compressa L.
Glyceria aquatica Wahlbg.
Hordeum nodosum L.
Ophioglossum vulgatum L.
Equisetum palustre L.
E. limosum L.

Aquilegia vulgaris now seems to be a frequent Norfolk fen plant. The flowers vary greatly in colour—white, blue or red to nearly chocolate.

Habenaria conopsea grows with its roots under water. The flowers are larger but fewer than when it grows in dry localities.

Foulden and Scarning Commons, Stow Bedon and Wretham marshland.

For these localities I shall only give additional uncommon plants as I have given above a typical flora.

They are heath- in contradistinction to meadow-marshes. At Stow Bedon there are many marshy pools amongst sandy hillocks, Foulden is in parts similar, but hillocks are chalk, and bear a characteristic chalk flora:—

Radicula palustris Moench.
R. amphibia Druce.
Stellaria palustris Retz.
Trifolium fragiferum L.
Drosera anglica Huds.
D. longifolia L.
Myriophyllum spicatum L.
Apium inundatum Reichb. fil.
Cicuta virosa L.
Peucedanum palustre L.
Achillea Ptarmica L.
Hottonia palustris L.
Utricularia vulgaris L.
Hydrocharis Morsus-ranæ L.
Sparganium minimum Fr.
Alisma ranunculoides L.
Scirpus pauciflorus Lightf.
Calamagrostis epigeios Roth.
C. canescens Druce.
Nardus stricta L.
Carex pilulifera L.
Lastræa Thelypteris Bory.
Osmunda regalis L.

The Droseras grow among *Hypnum* and not in connection with *Sphagnum*, although that occurs in some quantity in each locality.

At Scarning in May, 1912, I collected a monstrous form of *Cardamine pratensis*, in which, after seeding of the plant, each seed had produced a double flower, without stamens or pistil. Professor F. W. Oliver, to whom the matter was referred, remarked that "such a happening may be rare or even unique, but the latter point could only be decided by examination of botanical literature." To this literature I have not access.[*]

Saham Mere adds *Rumex maritimus* and *Ranunculus hederaceus*, the former being usually dwarfed but often two feet high. Scoulton Mere contains, with many of the above, *Cicuta virosa*, *Peucedanum palustre*, *Nymphoides peltatum* Rendle & Britten, and *Calamagrostis canescens*.

Mr. Arthur Bennett tells me he has a specimen of *Lastræa cristata* from Scoulton, dated 1883, but I could not find it there in 1910 or 1911. *Senecio palustris* has disappeared since it was recorded from here by Smith. This year I obtained *Liparis Loeselii* from the Wissey basin, a new river system for this plant.

In a few places the chalk comes to the surface, notably at Saham, Ashill, and Foulden, and the following chalk species result:—

Thalictrum minus L.
Hippocrepis comosa L.
Asperula cynanchica L.
Campanula glomerata L.
Gentiana Amarella L.
Spiranthes spiralis Koch.
Orchis pyramidalis L.
Ophrys apifera Huds.

Two of the plants mentioned under woodland species are of course typical chalk plants, *Aceras anthropophora* and *Ophrys muscifera*.

Trifolium subterraneum and *Thymus Chamædrys* occur on the sandy hillocks at Stow Bedon and at one of the Wretham Meres. The former has not previously been recorded for the district.

The following list contains the more uncommon of the remaining plants:—

Fumaria parviflora Lam.
Iberis amara L.
Isatis tinctoria L.
Silene conica L.
S. anglica L.
S. noctiflora L.
Claytonia perfoliata Donn.
Geranium pyrenaicum Burm. fil.
G. rotundifolium L.
G. columbinum L.
G. lucidum L.
Genista anglica L.
Medicago sylvestris Fries.
M. falcata L.
Medicago minima Desv.
Melilotus officinalis Lam.
Prunus Cerasus L.
Spiræa Filipendula L.
Tillæa muscosa L.
Sedum Telephium L.
S. anglicum Huds.
Sison Amomum.
Sambucus Ebulus L.
Anthemis arvensis L.
A. nobilis L.
Crepis biennis L.
Hypochœris glabra L.
Campanula rapunculoides L.

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[*] [This form, far from being unique or even rare, has frequently attracted the attention of field botanists, and is indeed by no means of uncommon occurrence—we have met with it several times in various places during the last forty years. It is well described by Bromfield in his *Flora Vectensis* (p. 34, 1856), quoted by Masters (*Vegetable Teratology*, p. 181, 1869), and is mentioned by Syme (Eng. Bot. ed. 3, i. 159). The fact that the equally common "phenomenon" connected with the production of new plants from the leaves attracted special attraction at a meeting of the Linnean Society last year (see Journ. Bot. 1911, 238) seems to show that our ecologists have much to learn with regard to our common British plants.—Ed. Journ. Bot.]

Legousia hybrida Delarbre.
Anagallis fœmina Mill.
Hyoscyamus niger L.
Linaria Elatine Mill.
L. minor Desf.
Antirrhinum Orontium L.
Mentha rotundifolia Huds.
M. alopecuroides Hull.
Calamintha Nepeta Savi.
C. montana Lam.
Stachys arvensis L.
Galeopsis Ladanum L.
Galeopsis speciosa Mill.
Chenopodium rubrum L.
Rumex pulcher L.
Mercurialis annua L.
Ornithogalum umbellatum L.
Colchicum autumnale L.
Apera Spica-venti Beauv.
Bromus secalinus L.
Agropyron caninum Beauv.
Lastræa spinulosa Presl.
L. aristata Rendle & Britten.

Isatis tinctoria L. Two miles from Westacre on the Lynn roadside. Perhaps not truly wild.

Sambucus Ebulus L. Castleacre. Trimmer gives Castle ruins, but this is probably an error for Priory ruins, as there are no plants near the Castle now.

Campanula rapunculoides L. Railway bank, Saham, about forty yards from an arch. Perhaps an escape.

Mentha alopecuroides Hull. is commonly cultivated here instead of *M. spicata* L., and is only found as an escape from cultivation.

Ornithogalum umbellatum L. In parts of the Brecklands plentifully.

Polygala serpyllacea Weihe. I found a variety approaching *vincoides* Chodat in a meadow which had been dug for clay at Saham. Mr. Bennett kindly identified it for me, but said it did not correspond exactly with any described form.

Helleborus fœtidus L. used to occur at Castle hill, Castleacre (Smith, *English Flora*). It has disappeared now as a wild plant, but is found in several gardens there, and one observer stated that he had dug a plant up from the Castle hill.

SUR UN *SEDUM* NOUVEAU.

PAR M. RAYMOND HAMET.

M. HOLE, directeur du "Forest Research Institute and College of Dehra Dun," a bien voulu mettre à ma disposition les nombreuses Crassulacées conservées dans l'important herbier de cet établissement. Dans ces matériaux j'ai découvert une curieuse espèce nouvelle que je suis heureux de dédier à M. Hole en témoignage de profonde reconnaissance.

Sedum Holei Raymond Hamet, sp. nova. Planta annua, steriles caules non edent. Radices fibratæ. Caules floriferi graciliusculi, basi repentes et ramosi, deinde erecti et simplices raro ramosi, glabri. Folia alterna, sessilia, infra insertionem in calcar producta; calcar integrum, obtusum; lamina linearis, marginibus integerrimis, apice obtusa, longior quam latior. Inflorescentia corymbiformis, satis laxa. Pedicelli calyce longiores vel paulo breviores, glabri. Flores satis numerosi. Bracteæ foliis similes. Calyx glaber, segmentis 5, infra insertionem in calcar productis;

calcar integrum obtusum; lamina lineari-oblonga, marginibus integerrimis, apice obtusa, longior quam latior. Corolla glabra, calyce longior vel paulo brevior, segmentis 5, tubo longioribus, oblongo-lanceolatis, apice acutiusculis et paulo mucronatis, mucrone petali apicem leviter superante, longioribus quam latioribus. Stamina 10, glabra; filamenta late linearia, oppositipetala infra corollæ medium inserta; antheræ late reniforme apice obtusæ et leviter cuspidatæ, superiores petali apicem leviter superantes. Carpella 5, multiovulata, glabra, in stylos quam carpella breviores attenuata. Squamæ 5, lineari-subteretes, apice leviter dilatatæ et concavæ, multo longiores quam latiores. Folliculi 5, multiseminati, erecti, lateribus-internis non gibbosis. Semina obovato-oblonga, testa leviter mamillata nucleum apice levissime superante. Caules floriferi 11–18·50 cm. longi. Foliorum et bractearum calcar 1–1·20 mm. longum; lamina 4·2–17 mm. longa, 0·65–1·8 mm. lata. Inflorescentia 4–5 cm. longa, 6–9 cm. lata. Pedicelli 4–15 mm. longi. Calycis calcar 0·8–1·2 mm. longum; lamina 3–6·83 mm. longa, 0·65–1·8 mm. lata. Corollæ pars concreta 0·1 mm. longa; pars libera 4·5–6·1 mm. longa, 1·6–2 mm. lata. Staminum alternipetalorum filamentorum pars concreta 0·1 mm. longa; pars libera 4–5·3 mm. longa, 0·6–0·8 mm. basi lata, 0·35–0·5 mm. medio lata. Staminum oppositipetalorum filamentorum pars concreta 1–1·60 mm. longa; pars libera 3·2–4·6 mm. longa, 0·5–0·55 mm. basi lata, 0·25–0·35 mm. medio lata. Antheræ 0·6–1 mm. longæ, 0·6–0·9 mm. latæ. Carpellorum pars concreta 1·2–1·6 mm. longa; pars libera 3·2–4·2 mm. longa. Styli 1·1–1·45 mm. longi. Squamæ 1·7–1·8 mm. longæ, 0·25–0·3 mm. basi latæ, 0·2 mm. medio latæ. Semina 0·65 mm. longa, 0·22 mm. lata.

E. Kumaun, Chipla, 1888 (Ráumtch, n. 7973. Specimen authenticum in herbario Dehra Dun).

Obs.—Hæc species, quamvis *Sedo glaciale* Franchet,* *S. tenuifolio* Franchet,* *S. obtusipetalo* Franchet* et *S. Forresti* Raymond Hamet† valde affinis sit, distinctissima est.

A *S. glaciale*: 1° caulibus floriferis longioribus (11–18·5 cm. et non 2·5–3·5 cm.); 2° foliis multo angustioribus; 3° sepalis lineari-oblongis apice obtusis, et non obovatis, vel obovato-oblongis, apice acutis et leviter cuspidatis, differt.

De *S. tenuifolio*: 1° petalis oblongo-lanceolatis, et non unguiculatis, ungue sublineari, lamina ovata; 2° seminibus testa leviter mamillata, et non e rugis in longitudinem dispositis, prominulis, instructa, discrepat.

A *S. obtusipetalo*: 1° foliis angustioribus; 2° petalis latioribus; 3° staminum oppositipetalorum antheris petali apicem, et non petali medium, paulo superantibus; 4° squamis multo longioribus quam latioribus, et non vix longioribus quam latioribus distat.

A *S. Forresti*: 1° foliis linearibus, et non obovato-linearibus vel obovato-oblongis; 2° sepalis lineari-oblongis et non obovato-oblongis; 3° petalis angustioribus abest.

Denique ab his speciebus antheris apice cuspidatis dissidet.

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* Journ. de Bot. x. 289–90 (1896).

† *Plantæ Chinenses Forrestianæ*, p. 118, lxxv. (1912).

WORCESTERSHIRE PLANTS.

By R. F. Towndrow.

The following plants have not been recorded for the Malvern district of Worcestershire, and those marked with an asterisk are also new to the county.

**Fumaria Borœi* Jord. var. *verna* Clavaud. Abundant in an arable field at Welland, April, 1912.

Viola sylvestris Kit. forma *leucantha* G. Beck. Half Key, near Malvern.

**Trifolium dubium* Sibth. var. *pygmæum* Soy. Will. Castlemorton Common.

**Vicia tetrasperma* Moench var. *tenuissima* Fr. Hanley Castle.

**V. Cracca* L. var. *argentea* Coss. & Germ. Malvern Wells.

Sedum purpureum Tausch. Welland. This confirms the species as a Worcestershire plant. It is entered, with some doubt, in Amphlett & Rea's *Botany of Worcestershire.*

Caucalis daucoides L. One plant in farmyard, Malvern Wells.

**Callitriche obtusangula* Le Gall. Abundant in ditches on the Common at Gnarlford, *F. C. Morgan & R. F. T.*

**Gnaphalium uliginosum* L. var. *pilulare* (Wahlenb.). Malvern Link Common, 1877. Castlemorton, 1912.

**Cnicus arvensis* × *palustris.* Castlemorton Common.

**Hieracium Pilosella* L. var. *concinnatum* F. J. Hanb. Hill above Little Malvern.

**H. serratifrons* Almq. var. *grandidens* Dahlst. Grassy bank, Malvern Wells.

**H. pinnatifidum* Lönnr. var. *vivarium* Lönnr. Grassy bank, Malvern Wells.

**H. sciaphilum* Wechtr. var. *transiens* Ley. Grassy bank, Malvern Wells.

**H. sabaudum* L. var. *rigens* (Jord.). Railway cutting and embankments, Malvern and Bransford. The four last mentioned species have been kindly named by the Rev. E. F. Linton.

**Leontodon nudicaule* Banks & Soland. var. *lasiolænum* Druce. Castlemorton, Barnard's Green, and Malvern Link Commons, and on a hedgebank at the Rhydd.

**L. hispidum* L. A plant which I have observed in Welland and five adjoining parishes is considered by Mr. C. E. Salmon, to whom specimens gathered at Little Malvern were submitted by Mr. A. J. Crosfield, to be the variety *glabratus* Gren. & Godr. It has the involucre and upper part of scape glabrous. It differs from var. *hastile* L. by having hairy leaves, though it exactly matches a plant I received from the B. E. C. so labelled.

Chenopodium serotinum L. Abundant on a rubbish-heap at Malvern. This plant is placed in the table at the end of Edwin Lees's *Bot. of Worcestershire* (1867) as having occurred in the Severn District, and at p. xlvii. of that work is included with plants that have but one record each. This record, therefore, is only new for Malvern.

**Polygonum Hydropiper* × *Persicaria*. One plant only, growing with its presumed parents. Barnard's Green, Malvern.

**Mercurialis perennis* L. var. *ovata* (Steud.). Malvern Wells.

**Juncus effusus* L. var. *compactus* Lej. Hill at Little Malvern.

**Bromus tectorum* L. One plant only, on railway siding, Malvern, 1896.

THE NOMENCLATURE OF *TARENNA*.

By H. F. Wernham, B.Sc.
Department of Botany, British Museum (Nat. Hist.).

The discovery of some new African species of this genus among recent collections sent to the National Herbarium has drawn my attention to the considerable confusion which has arisen in regard to its proper designation.

The genus was based on a plant named *Cupi* in the *Hortus Malabaricus*, ii. 23 (1678), and Linnæus named it *Chomelia* in the first four editions of his *Genera Plantarum*.

In the *Species Plantarum* (1753, p. 172) the same plant is named *Rondeletia asiatica*, and the name *Chomelia* is abandoned. The latter is, therefore, untenable, though several African species have been described by K. Schumann and others under that name. It is properly assigned to Jacquin's *Chomelia*, a distinct tropical American genus.

The next definite reference is by Adanson in 1783 (Fam. des Plantes, ii. 158), where he uses the original name *Cupi*. The latter, strictly speaking, is thus the earliest name for this genus; and De Candolle takes it up in the form *Cupia*, Prodr. iv. 393 (1830). The name *Cupi* has, however, never been used, and it seems desirable that it should be included in the list of "nomina rejicienda." In this case *Tarenna* Gaertn. Fruct. i. 139, t. 28 (1788) stands, and this is adopted in Dalla Torre & Harms, Gen. Siph. 497 (1905).

Schreber (Genera, n. 1733, 1791) names the genus *Webera*, and this name has been fairly generally used for the Asiatic species. Gaertner fil., Fruct. iii. 71, figures the fruit and seeds (t. 192); the former seems to differ in its erect pentamerous calyx from his father's figure (*loc. cit. supra*) of *Tarenna*, in which the fruiting calyx comprises four patent lobes. These differences may not, however, be regarded as essential, for there are good reasons for supposing that Gaertner's *Tarenna zeylanica* and *Webera corymbosa* W. are identical. J. Gaertner gives Tarennæ as the Cingalese name for *Tarenna zeylanica*; Thwaites, Enum. Pl. Zeylan. 158 (1864) gives *Tarrana-gass* as the native name for *Stylocoryne Webera* Rich.—*i.e.*, *Webera corymbosa* W.; Trimen, Fl. Ceylon, ii, 328, spells the same name *Tarana*. In any case it seems clear, in view of this association of native names, that J. Gaertner's *Tarenna* was founded upon a specimen of *Webera corymbosa* W. (=*Cupi*), which is common in the island of Ceylon.

In all the circumstances it will doubtless be generally acceptable to retain the name *Tarenna* for this genus, and to reject *Cupi*, although the latter is the correct name if the rules of the Vienna Congress be strictly observed.

The first African species were originally described by Bentham in Hook. Niger Fl. 389–90, under *Stylocoryne* (= *Stylocoryna*), a genus comprised of species subsequently relegated to various genera, chiefly *Randia.*

IN MEMORY OF JOHN GERARD, S.J.

(1840–1912.)

The Rev. John Gerard, S.J., who died at the Jesuit house in Farm Street on the 13th of December, was born in Edinburgh on May 30th, 1840. His father was Colonel Archibald Gerard of the 92nd Highlanders; his brother, the late General Sir Montagu Gerard, K.C.B., was a distinguished officer of the Indian Army, and to some extent shared Father Gerard's interest in natural history—a few plants collected by him in the Western Himalayas are in the National Herbarium. Curiously unlike the traditional notion of a Jesuit, Father Gerard's association with the Society dated from early youth, as he entered the Jesuit novitiate in 1856. After his philosophical course, at the end of which in 1859 he took his B.A. degree at the London University, he was engaged in teaching and study until his ordination in September 1873; after this he was put in charge of the school course at St. Francis Xavier's, Liverpool, and subsequently at Stonyhurst, where he remained until his transference to London in 1893.

It was at Stonyhurst that Father Gerard developed the taste for natural history which had interested him from his earliest years; a notebook, written in a very childish hand, is devoted to phenological observations: "when I first and last saw birds, butterflies, flowers, &c." He went to Stonyhurst at the period when the public schools were devoting much attention to Natural Science. Father Gerard saw in it a powerful means of arousing interest and of encouraging observation, and soon communicated to his pupils—some of whom still speak of the pleasure of a walk with him—his own enthusiasm. The "Preliminary Flora of Stonyhurst," printed in the *Stonyhurst Magazine* for May, 1886, of which a second edition was published at Clitheroe as a pamphlet in 1891, was mainly the outcome of these walks, and both, although no name is associated with them as author, are practically Father Gerard's work. He became editor of *The Month* shortly after his arrival in London, and soon began to publish in its pages the series of papers which have been issued by the Catholic Truth Society in collected form under the title *Essays in Un-natural History.* At the period when they began, the writings of Grant Allen were greatly in vogue, their author, by dint of a lively imagination and an attractive style, having secured the ear of the pseudo-scientific public. Father Gerard subjected Allen's statements to examination by the light of facts, and had little difficulty in showing that these did not support the theories which had been based upon them. This he was able to do in a style hardly less attractive than that of Allen and his followers and allies; and even those who were opposed to Gerard's attitude and his conclusions admitted that he spoke with a knowledge which was often lacking to those whom he controverted. He was not, as was sometimes assumed, opposed to the theory of evolution in itself, for, as one of his biographers has said, "he never wished to resist any facts solidly established by scientific research"; but he applied to it the phrase familiar to courts of law in his native land, and regarded it as "not proven."

Father Gerard's knowledge of British plants was general rather than critical; he however always noted those of any neighbourhood in which he might happen to be, bringing or sending his specimens for comparison and identification to the Department of Botany, where he was a frequent and always a welcome visitor. In 1900 he was elected a Fellow of the Linnean Society and became a frequent attendant at its meetings, often taking part in the discussions thereat; an address given before the Society in 1905 on *Arum maculatum*—a plant in the life-history of which in relation to insects he took particular interest—will be found in this Journal for 1905 (p. 231); other contributions from his pen—mostly in the form of reviews, which were always interesting and suggestive—range from 1897 until last year. His most important work was the volume in answer to Haeckel entitled *The Old Riddle and the Newest Answer*, which, originally produced as a six-shilling book, went into a sixpenny edition of which 20,000 copies have been printed.

Of the other aspects of Father Gerard's work an account (with portrait) will be found in *The Month* for January, to which we are indebted for some of the facts given above.

SHORT NOTES.

Polygala Babingtonii, Druce.—In the *Journal of Botany*, 1912, p. 229, Mr. Arthur Bennett published a note on *P. vulgaris* var. *grandiflora* Bab. in which he suggests that the Irish plant from Ben Bulben should be called *P. vulgaris* var. *Ballii* (Nyman). This raises a curious point in nomenclature. *P. Ballii* Nyman is a nomen nudum. It is based on a specimen in Ball's Herbarium, presumably the above plant, which Ball had labelled in MS. *P. buxifolia*, but this name had already been given by Humboldt, Bonpland, and Kunth to a South American species. Nyman's name is not only a nomen nudum, but is invalid according to the "Actes," since it is only quoted in synonymy. But the name var. *Ballii* had already been given to a variety of *P. vulgaris* which is common in the Faroes by Dr. C. H. Ostenfeld in Warming's *Botany of the Faroes*, 71, 1901, which he describes and figures, and which, a specimen he sent me proves, is not identical with the Ben Bulben plant. I have gathered plants which may be placed under it at Inchnadamph, Sunderland; at Ardrahan, Galway; the Burren, Co. Clare; and to it may perhaps go Mr. Arthur Bennett's interesting Kentish specimens, to which he refers on p. 230. It also occurs on the limestone at Ben Bulben, and this form has been by more than one botanist mistaken for Babington's plant; it was such a misnamed specmen which induced my friend Dr. Williams to give it so subordinate a position in his *Prodromus*. On my first visit to Ben Bulben I only saw this form, as I did not work the cliffs on the western and seaward side of that interesting hill. When on a subsequent occasion I saw the real plant growing on the seaward-facing cliffs, I became convinced that it was a distinct species (perhaps not in a Benthamian sense), and therefore in the *Rept. Bot. Exch. Club*, 1909, 440, I suggested it should be called *P. grandiflora*, forgetting that in the *Prodromus*, 125, 1824, De Candolle had under *vulgaris* a var. *grandiflora* which was certainly not our plant. As *P. Ballii* was a nomen nudum and had as a variety already been described for another plant, I ventured (*Rept. Bot. Exch. Club*, 1911–12) to name it *P. Babingtonii*, to connect it with the veteran botanist who first brought it to our notice in the pages of his *Manual*.—G. CLARIDGE DRUCE.

"SALICORNIA DOLICHOSTACHYA sp. nov. S. (dolichostachya) colore viridi v. flavo-viridi; decumbens, flaccida v. subflaccida, sæpius ramosissima; 5–30 cm. alta; segmentis brevibus vel longis; spicis longissimis (etiam 8–16 cm. longis), nonnunquam curvatis, brevibus sæpe ramis præcipue ad basim, segmenta 15–30 exhibentibus. Differt ab omni alia specie annua quippe qua flores laterales inter se florem terminalem inclusum tenent perennium specierum ad instar."—C. E. Moss in *New Phytologist* xi. 409 (December, 1912).

SCROPHULARIA ALATA Gilib. IN SURREY.—Lately in looking up the genus for a very odd cut-leaved specimen shown me by Mr. C. E. Salmon, I found that a specimen gathered in 1863 by the Mill Pond at Waddon, near Croydon, was the above species. At that date I had named it "aquatica" by Bentham's *Handbook*. Mr. Salmon tells me he has no record for Surrey. So far as I know, the only addition to the distribution since the Supplement to Top. Botany is one passed over then, *i.e.*, 28. Norfolk W. (Journ. Bot. 1904, 313).—ARTHUR BENNETT.

CAREX PSEUDO-CYPERUS L. IN NORTH LANCASHIRE.—I found this beautiful *Carex* growing well at two stations in Roudsea Wood, Low Furness, during August last. This is a new record for v.-c. 69. In the boggy shade of the same wood occurs *C. paniculata* L. var. *simplex* Gray, which has not been previously recorded for the North Lancashire portion of v.-c. 69. This also applies to *C. muricata* L., which I gathered on the railway bank a mile south of Ulverston Station. I am indebted to Mr. Arthur Bennett for confirming the name of the three species.—W. H. PEARSALL.

REVIEWS.

The Early Naturalists: Their Lives and Work (1530–1789). By L. C. Miall, D.Sc., F.R.S. 8vo, pp. xii. 396. Macmillan. 10*s*. net.

Most of the advance which the study of nature has made during the last four centuries has unquestionably depended mainly upon the substitution of the examination of plants and animals for that of the descriptions of them handed down from ancient times. The recognition of this fact led to an opposite extreme, and not long ago some biologists spoke and wrote as if determined to ignore their predecessors, believing nothing but what they had themselves examined, and thus obviously wasting much effort in repeating observations already made, and narrowly restricting their own possible achievement. We seem now to be seeking the golden mean, and many disciples of the "new biology" are realizing that—though as Dr. Miall truly remarks in his Preface, "the discoveries, even of great men, have often been vitiated by serious mistakes, which have subsequently been corrected by men of far inferior power"—there were great men in the past, and that, if we wish to advance the cause of science, we cannot afford to ignore the history of their labours.

We congratulate Dr. Miall upon the thoroughly satisfactory work that he has produced with a view of stimulating a taste for such history. He has, of course, taken the sensible view of "Natural History" as including plants as well as animals, though he owns that his own predilection has led him to give rather more space to the early entomologists than to others. Unfortunately though it is true that "the classics of natural history are not very much studied in our own time," and that "the works of Malpighi, Swammerdam, Ray, Leuwenhoek, and Réaumur are still within the purchasing power of ordinary students," the dictates of fashion have put many of our earlier botanical works in a different category. We are sure that there are scores of students of biology to whom most of the contents of Dr. Miall's book will be new, and we are equally certain that none of them can fail to find his history interesting.

The book is full of quaint odds and ends from these fascinating bye-paths of nature-lore, though at the same time it affords a consecutive narrative of the progress of biology during two and a half centuries. Our main complaint of it is that we want more—some missing names, more personal biography, more direct quotations, and more bibliographical detail; but this would of course mean a much larger book, and perhaps, therefore, a smaller audience. We grudge the few pages of introduction, dealing very slightly with the time before Brunfels; we grudge the space wasted on headings to paragraphs which might have appeared as marginal insets, and we are inclined to grudge Buffon his thirty concluding pages. References are generally given to reprints and to fuller biographies, but Dr. Miall might easily have added a list of authorities; neither the account of the

Arabic herbalists in Randal Alcock's *Botanical Names* nor Pulteney's *Biographical Sketches* are as well known as they should be, and we notice the absence of any reference to the reprint of Turner's *Names of Herbes* by the Editor of this Journal, or to the full life of Gerard prefixed to Dr. Daydon Jackson's reprint of the *Catalogus*.

We are very grateful, however, for what we have; for such clear guidance as the statement (p. 26) that the five hundred woodcuts of Fuchs's *Historia Stirpium* "probably surpass in artistic quality any long series of botanical figures that has ever been published," for Dr. Caius's account of British dogs, and for the historical table of botanical terms on p. 349. If Gesner is treated too briefly and Parkinson omitted, we have valuable accounts of Oviedo and Acosta and the American animals which they were among the first to describe; whilst if Ray, Linnæus, and the Jussieus are sufficiently well known already, we are glad to hear more of Martin Lister, Robert Hooke, Réaumur, and other lesser lights.

That Dr. Miall has spared no pains in his loving research into original authorities is seen by the following amusing mare's-nest (p. 149):—

"Sprengel, Cuvier, Sachs, and perhaps other historians of Botany mention Henshaw as the discoverer of spiral vessels in walnut-wood (1661). The only ground for this statement and, so far as I can find out, the only record of Henshaw's work in botany is this minute of a meeting of the Royal Society (July 31st, 1661): 'Mr. Henshaw exhibited the spirals of nut-trees, showing that they grow snail-wise' (Birch, *Hist. of Roy. Soc.* vol. i. p. 37). These spirals must surely have been hazel-stems strangled by honeysuckle."

G. S. Boulger.

Makers of British Botany: a Collection of Biographies by living Botanists. Edited by F. W. Oliver. 8vo, cl. Pp. 332, with numerous portraits and other illustrations. Cambridge, at the University Press. 1913 [1912]. Price 9*s.* net.

The title of this interesting and attractive volume is somewhat misleading: for "British Botany" is generally understood as relating to the flora of our country, and the "makers" of this, so far as investigation of the plants of Britain are concerned, are for the most part conspicuously absent. It is true that Hill, Sir William Hooker, and in a less degree Robert Brown, devoted some attention to our native plants; that the names of Harvey, Berkeley, and Williamson are associated respectively with the seaweeds, fungi, and fossil plants of Britain; but the long list of those who have devoted themselves to the investigation of the British flora, from Turner and the herbalists through Ray and Withering to Sir J. E. Smith and C. C. Babington, is unrepresented. The biographies selected are of those who may be more accurately described as British makers of Botany, for it is their influence on the science as a whole that forms the subject of the sketches; and even from this standpoint we miss certain names, *e.g.*, that of Bentham—and others which, as Prof. Oliver says in his introduction, we should have expected to find.[‡] The omission of Darwin is explained by reference to the centenary volume published by the same Press, but its absence gives a sense of incompleteness to the book. Had the contents of the volume been limited to the botanists who formed the texts for the ten lectures delivered at University College in 1911, their restriction would have appeared more reasonable, but the addition of others renders it difficult to understand on what principle the selection has been made, though we gladly allow that some of these additions are among the most interesting chapters of the book.

The following list from the Introduction indicates both the subjects of the book and the order and authorship of the biographies:—

[*]Robert Morison . .	1620–1683.	Prof. Vines.
[*]John Ray . . .	1627–1705.	
[*]Nehemiah Grew . .	1641–1712.	Mrs. Arber.
[*]Stephen Hales . .	1677–1761.	Francis Darwin.
John Hill . . .	1716–1775.	T. G. Hill.
[*]Robert Brown . .	1773–1858.	Prof. Farmer.
[*]Sir William Hooker .	1785–1865.	Prof. Bower.
[*]Rev. J. S. Henslow .	1796–1861.	Prof. Henslow.
John Lindley . . .	1799–1865.	Prof. Keeble.
[*]William Griffith . .	1810–1845.	Prof. Lang.
[*]Arthur Henfrey . .	1819–1858.	Prof. F. W. Oliver.
[*]W. H. Harvey . .	1811–1866.	R. Ll. Praeger.
Rev. M. J. Berkeley .	1803–1889.	George Massee.
Sir Joseph Gilbert . .	1817–1901.	Prof. Bottomley.
[*]W. C. Williamson . .	1816–1895.	Dr. Scott.
H. Marshall Ward . .	1854–1905.	Sir W. Thiselton-Dyer.
The Edinburgh Professors	1670–1887.	Prof. Balfour.
[†]Sir Joseph Dalton Hooker	1817–1911.	Prof. Bower.

These names give but an imperfect notion of the contents of the book, for the authors, in many cases, have devoted attention to botanists associated personally or from a literary standpoint with the main subjects of the notices. This is naturally especially the case in the earlier portion; it was impossible to discuss the work of Morison and Ray without some reference to those who had preceded them in attempting methods of classification, and the influence of Cesalpino, Bauhin, and Jung is recognized. Grew's indebtedness to Hooke, which the former duly acknowledged, is pointed out; and, to take an example from the later biographies, fuller information (accompanied by a charming portrait) than has hitherto been published is given concerning Henry Witham, "the first Englishman," says Dr. Scott, "to investigate the internal structure of fossil plants." These incidental subjects are made accessible by the excellent index, which serves also to call attention to the omission, to which we have already referred, of any reference to most of those to whom we are accustomed to apply the term "British botanists."

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[*] These were subjects of lectures in the University course.

[†] Sir Joseph Hooker's name is omitted from the list of contents given on p. 2 of the volume.

[‡] He also thinks that the absence of "special reference to the work of Priestley, Cavendish and *Sénébier*" "will not escape criticism": but what should a Frenchman do *dans cette galère*?

From a literary standpoint the value of the biographies varies considerably, but it usually attains a high level. Mr. T. G. Hill's account of his namesake contains much that has not hitherto been brought together, and the versatility of the "Knight of the Polar Star" renders the sketch interesting and even amusing. The estimate of John Hill published by Mr. Druce in this Journal for 1908 (p. 8), and arrived at independently by those who have made themselves acquainted with Hill's work, is on the whole maintained. In this biography, however, we find examples of the carelessness in proof-reading which unfortunately disfigures the book, and greatly detracts from the pleasure of reading it. Thus on p. 104 we read of "recent editions of *British Flora*"—the two last words printed in italics, thus indicating the title of a book, though the footnote shows that the last edition of Babington's *Manual* and Hayward's *Botanist's Pocket Book* are intended. "Neudramini" (p. 107) should of course be Vendramini; "Lucinu" (p. 89) Lucina; "Theophil*o*us" and "Lord Petr*ie*" (for Petre) are on pp. 84, 85. "Sir Robert Ka*v*e" (p. 169), "Sloan, Pet*t*iver" (together, p. 283), "Hew*i*tt C. Watson" (p. 293), "*Magnum Opus*" (p. 312), should not occur in a volume printed by the Cambridge University Press and edited by one of our foremost botanists. The name of Mr. "Solby," to whom Griffith "always sent his papers for submission to the Linnean Society" is unfamiliar to us, although he belonged to "the distinguished circle of English botanists of his [Griffith's] time." Even more serious slips are not absent: who could suppose that by Brown's "Kew lists, which were published under Aiton's name," Prof. Farmer was referring, as we imagine must have been the case, to Aiton's *Hortus Kewensis*—"well known," indeed, as we are told, "to students of systematic botany," but, one would imagine, unknown even by sight to the writer who thus describes it. If he will consult the Supplement issued with this Journal last December, Prof. Farmer will be able to understand the surprise with which we read his airy reference to a work which embodied the labours of the best British systematists of the time. It is only right to add that Prof. Farmer's account of Brown is by far the best that has appeared—that in the *Dictionary of National Biography* being, as pointed out in this Journal for 1888, p. 285 (which contains information additional to that given by Prof. Farmer), "little more than a clumsy paraphrase with some added errors" of J. J. Bennett's obituary notice; but we think his references to the National Herbarium, where are preserved Brown's MSS. and collections, as well as the diary from which he quotes, might have been more definite.

Among the notices of more recent botanists that of Marshall Ward, by Sir W. Thiselton-Dyer, reprinted from the Proceedings of the Royal Society and accompanied by an excellent portrait, is one of the most attractive. That of Sir Joseph Hooker by Prof. Bower is also very well done, although we demur to the description of the *Index Kewensis* as "the fourth of [his] great systematic works." There has always been a tendency to exaggerate Hooker's connection with this important work, for which indeed, as we pointed out in this Journal for 1893 (p. 311), his preface to the *Index* (in which the name of the actual compiler, Dr. B. D. Jackson, finds no place) is partly responsible. This is in no way intended to depreciate Hooker's share in the book: its inception is due to him, and he read the whole in proof, adding to or revising the geographical distribution (which however is its weakest part); but the bulk of the actual work fell to Dr. Jackson's share. Professor Bayley Balfour's account of "The Edinburgh Professors" from 1670 to 1887 abounds in interesting and little-known information.

Much more might be written of so suggestive a volume did space permit; but enough has been said to show its interest and value. We hope that someone may be found to prepare a companion volume, in which the actual "makers of British Botany" shall be adequately recognized.

Sylviculture in the Tropics. By A. F. Broun. Pp. xviii, 309. Macmillan & Co. Price 8*s*. 6*d*. net.

The author, formerly a Forest Officer in India, Ceylon and the Sudan, modestly apologises for the too comprehensive title of his work, he having apparently no personal knowledge of Tropical America and Australia. His book appears to us, however, as far as we have tested it, to be eminently sound and practical, especially, perhaps, in Part i, dealing with the factors influencing the existence of forests, and Part iv, on special measures of maintenance and protection. Confessedly much indebted to Schimper, the author has also made good use of more recondite sources of information, such as the reports of various forest departments, and speaks with the unquestionable authority of one who has personally examined into the facts. Considerable lists of trees characterizing various climates, soils and situations are given, the aggravating practice of using vernacular names by themselves being avoided and the scientific names correctly spelt. The result is a very complete picture of tropical forest vegetation, its conditions, enemies, and influence upon climate. The soils of India, the distinctive climatic features of the tropical zone, and the effects of grazing, are topics treated with special interest in Part i; while the tropical forest nursery, with its shadoofs, sakia, and other irrigation methods; the discussion of the various methods of natural forest-regeneration and of fire-protection and the fixing of shifting soil, are among the more prominent subjects dealt with in the latter part of the book. The clear figures of various useful tools, which should enable any native workman to produce them, and, in fact, the book, as a whole, should prove of real value in any of our tropical colonies.

G. S. Boulger.

Die offizinellen Pflanzen und Drogen. Von Dr. WILHELM MITLACHER, a.o., Professor für Pharmakognosie an der Universität Wien. Carl Fromme. Wien und Leipzig. 1912. 8vo, pp. 1–136.

THE object of this little brochure is to give some idea of the medicinal plants and drugs that are "officinal" in the pharmacopœias of Europe, Japan, and the United States. The term "officinal" employed by Dr. Mitlacher is used in the sense in which "official" is taken in this country. The author began the work with the view of ascertaining the number of medicinal plants that might be profitably cultivated in different countries, but at the request of various botanical teachers and medical friends was led to arrange the material in systematic order, under the families of plants to which the drugs belong. The medicinal plants and plant products of twenty-two pharmacopœias are included. The arrangement followed is that of Engler and Prantl's *Naturlicher Pflanzenfamilien* and R. von Wettstein's *Handbuch der systematischen Botanik.*

It is difficult to realise in this country how many plants are official (*i.e.*, authorised) in foreign pharmacopœias, which in this country are sold only by herbalists, and would here be regarded as officinal ("officina," a workshop). It will readily be understood that the number of plants is considerable, since they belong to one hundred and twenty-eight families. Under each plant brief mention is made of the part of the plant employed, its therapeutic uses, and the pharmacopœias in which it occurs. Anyone interested in medical botany will therefore find this enumeration very useful for reference. But, like most works of the kind, in the first edition there is room for improvement. Thus, the Addendum to the British Pharmacopœia has been overlooked, and several valuable Indian and Colonial drugs are consequently omitted. Indeed, it is a pity that all pharmacopœias at present in use are not included. The idea of the work is a novel one, and worthy of further development. A few corrections might be made in a future edition. Thus (p. 25), Butua is a name applied to *Chondrodendron tomentosum* R. & P., but not to *Cissampelos Pareira* Linn., and the latter is not identical with *Chondodendron platyphyllum* Miers. *Gynocardia odorata* R. Br. is not the source of Chaulmugra oil, which was shown some years ago in the *Pharmaceutical Journal* (4), xii., p. 596*, to be derived from *Taraktogenos Kurzii* King. *Ferula rubricaulis* Boiss. (p. 65) cannot yield Galbanum, since the plant has the odour of Asafœtida. Siam Benzoin (p. 68) has quite recently been determined to be the produce, not of an unknown species, but of *Styrax benzoides* Craib. *Scopolia carniolica* Jacquin (p. 71) was spelt *Scopola* by that botanist; *Mentha canadensis* var. *piperascens* Briq. (p. 81) does not correspond exactly to *M. arvensis* var. *piperascens* Holmes, since the former has narrower and more elliptical leaves, and yields much more menthol than the latter.

The impression is conveyed in the text (p. 86) that all the official *Strophanthus* seeds contain the same active principles, which is certainly not the case, and *S. Kombe* Oliv. is not the only species that is used in the preparation of arrow poison. *Grindelia robusta* Nutt. (p. 94) has been shown by Perrédès not to be the species that is used in medicine, which is *G. camporum* Greene, although of course that species is mentioned in the present pharmacopœia. These criticisms show that current English literature has been somewhat neglected, and the hope may be expressed that, by remedying this omission in a future edition, the work may be rendered still more useful to those readers for whom it is intended.

E. M. H.

The Botany of Iceland. Edited by L. Kolderup Rosenvinge and Eug. Warming. Part I.—i. The Marine Algal Vegetation, by Helgi Jónsson. Copenhagen: Frimodt. 1912. 186 pp. 7 figs.

It is some four years since the publication of that admirable Danish work *The Botany of the Faeroes* was completed. The promise then given that the Botany of Iceland should receive a like treatment is now in course of fulfilment. The present part initiates a series of monographs founded upon a thorough investigation of the entire flora of the island. The section here treated is the marine algal vegetation, and represents the outcome of the researches made during some years by the author, Helgi Jónsson. In 1887 Strömfelt published a paper, "Om Algevegetationen vid Islands Kuster," in which he gathered together all the older records of Icelandic algæ, adding to them the results of his own explorations; his work was mainly systematic. Jónsson, on the other hand, allots but twenty pages to his systematic list, and devotes the rest of the work, nearly one hundred and sixty pages, to an account of the local ecology and distribution of the algæ, treating the subject under the following heads:—(1) Life-conditions of the marine algal vegetation, in reference to the nature of the coast and to the ocean, air, and light. (2) Horizontal distribution of the species; also the components of the flora (with reference to their respective climatic origins). (3) Comparison with neighbouring floral districts. (4) Vertical distribution of the species. (5) Marine algal vegetation, with special reference to growth-associations of various species. (6) Differences in the vegetation in east and south Iceland. (7) Notes on the biology of the algæ along the coast of Iceland.

The impression left by a perusal of Jónsson's work is that it has been carefully elaborated, and that it will afford much help and instruction to those who are interested in the associations and in the distribution of algæ on our own coasts, especially in Scotland and Ireland.

A. & E. S. Gepp.

BOOK-NOTES, NEWS, &c.

Professor Darbishire's account of Antarctic Lichens (*Lichens of the Swedish Antarctic Expedition*, Stockholm, 1912) is full of interest, both on account of the large number of species recorded by him that have found a lodging on that inhospitable continent and of the questions of distribution, which he has discussed with much care. As the author remarks, "there is apparently no limit to the adverse conditions of cold and exposure which lichens can bear"; it is only necessary that they should remain for a longer or shorter period without snow. They are able to persist by reason of their power to dry up without thereby being killed; an important factor in their distribution and the only check to their advance over the rocks is the covering of perpetual snow. Up to the present time the most southerly point at which any plant has been found is 78° south latitude and 162° east longitude, where the lichen *Lecanora subfusca* was collected by members of Scott's Antarctic Expedition of 1901–1904 at a height of 5000 ft. The distribution of these plants is remarkable. As was to be expected, there is great similarity between the lichens of New Zealand and Subantarctic America and those of the Antarctic Continent, but practically half of the Antarctic plants are common also to the far-away Arctic regions. This accords well with other accounts of lichen distribution, certain identical species occurring on high altitudes over the whole planet, an argument for the great age and fixity of these cosmopolitan plants. Professor Darbishire has divided the territory of the expedition into three districts: Subantarctic America, South Georgia, and the Antarctic. In these, 86 genera of lichens are represented, with 366 species in the first district; 55 in the second, and in the Antarctic 106, by far the largest number everywhere being crustaceous rock-forms. The new species are illustrated by photographs.—A. L. S.

Intelligence has reached us of the death of Edward Horace Swete, M.D., D.P.H., in his eighty-sixth year. Dr. Swete appears to have passed through his medical curriculum at Bristol, and he became the first Lecturer on Botany in the Bristol Medical School on its institution. At the age of twenty-seven he published the *Flora Bristoliensis*, which came out in 1854. This was a careful compilation, with excellent introductory matter, and mentioned about eight hundred and ten species as growing within a circle of five miles' radius. Providing the first comprehensive account of the plants known in the vicinity of Bristol, the book had considerable local interest, and so continued for many years until work on modern lines was undertaken by another generation of botanists. It is a curious fact that Dr. Swete's pursuit of botany apparently ended with the issue of his *Flora*. No further note on the subject is known to have been penned by this author. He left the city, practised for a long period at Worcester, and afterwards at Weston-super-Mare; filled many public offices, and then lived in retirement in Wiltshire and at Seaton, where he died on December 4th and was buried on December 6th.—J. W. W.

At the meeting of the Linnean Society on December 19th Mr. Cecil H. Hooper gave an account of "experiments on the pollination of our hardy fruits, with observations on the insect visitors to the blossoms." He stated that strawberries, provided there is wind, set fruit well without insects. Raspberries and loganberries generally set fruit imperfect in shape if insects are excluded. Red, white, and black currants and gooseberries, owing to the construction of their flowers and pollen (which is glutinous), cannot be pollinated and set their fruit without the visits of insects, more particularly hive and bumble bees. All the previously mentioned plants set fruit perfectly with pollen of the same variety or even of the same flower; but in the case of the apple, pear, plum, and cherry, this is not always the case, many varieties being self-sterile, and almost all produce more abundant and finer fruit with pollen of another variety. In these trees there is very little transference of pollen by the wind, and even if a self-fertile tree is enclosed in muslin whilst in blossom (there being ample movement of the wind, insects only being excluded), it is the exception for any fruit to set; it is the same with gooseberries and currants. In trials with apples, only 19 varieties out of 65 proved self-fertile; in pears, 4 out of 30; in plums, 21 out of 41; in cherries, 5 out of 12; whilst, when cross-pollinated, in three quarters of the trials one or more fruits set on a truss. There seems to be a preference as to pollen, some varieties setting better with pollen of one variety than of that of another; and some varieties will not set with certain pollen. The knowledge of the usual order of blossoming is useful as a guide for interplanting varieties, so as to choose varieties that flower about the same time for planting together. Out of nearly 3,000 insects observed this spring visiting the blossoms of the various fruit-bushes and trees, 88 per cent. were hive-bees, 5½ per cent. bumble and other wild bees, and 6½ per cent. flies, ants, beetles, wasps, and other insects; but the latter group have not fluffy bodies for carrying and transferring pollen, and chiefly amuse themselves eating the pollen, and are not therefore proportionately as useful as the hive and wild bees.

At the same meeting Dr. Stapf exhibited specimens of wild rice, annual and perennial. He defined "wild rice" as including all spontaneously growing forms of *Oryza*, which, as far as the structure of their spikelets is concerned, might be considered as conspecific with *Oryza sativa*, except that their spikelets are readily deciduous when mature. He showed in a map the present extension of rice-cultivation, and traced briefly its history; whilst another map demonstrated the area of the genus *Oryza*, with the exclusion of cultivated rice. He then pointed out the main areas of "wild rice," as defined above:—(1) in North Australia; (2) in India, with extensions to Cambodja and possibly Borneo; (3) in tropical Africa, from Abyssinia to the Niger; (4) in Senegambia, and possibly extending to the region of Lake Tchad; (5) in South America. The "wild rices" of areas 1–3, and possibly some of area 5, are annual, the remainder perennial. He concluded with the suggestion that the domesticated rices are probably polyphyletic, most having originated from the "wild rices" of area 2, and some from those of areas 3 and possibly 5.

The results of the International Phytogeographical Excursion in the British Isles which took place in 1911 continue to occupy considerable space in the *New Phytologist*. In the October issue Dr. C. Schröter contributes "Einige vergleiche Zwischen Britischer und Schweizerrischer vegetation"; Mr. Druce in November prints "Additional Floristic Notes"; and in December Dr. Moss has "Remarks on the Character and Nomenclature of some critical plants noticed in the Excursion." The last paper contains a great deal of interesting and important matter which might have been made more easy of consultation had greater variety of type and spacing been employed; black type is indeed occasionally introduced, but it is not easy to understand with what significance. We note that Dr. Moss is acting upon his own suggestion (see p. 21) as to the use of ignoring capitals for proper specific names—*e.g.*, *Orchis* "*o'kelleyi*" (*sic*)—in which we hope he will not be followed. His paper includes many notes on *Salicornia*; in the course of which he reduces to a variety of *S. perennis* the plant published by him in this Journal for 1911 (p. 179) as *S. lignosa*, and creates a new species—*S. dolichostachya*—of which we reprint the diagnosis on p. 61.

In the *Proceedings* of the Dorset Natural History Field Club (vol. xxxiii. 1912) Mr. W. Bowley Barrett publishes "Contributions to a Flora of Portland, with special reference to *Limonium recurvum*," the plate of which is reproduced from this Journal for 1903. The list of Portland plants has evidently been drawn up with much care, and shows much observation. *Glaucium flavum* is "much destroyed by 'trippers,'" and *Eryngium maritimum* suffers in like manner; the great increase of *Diplotaxis muralis* var. *Babingtonii*, first observed in 1876, is noted; other rapidly increasing introductions are *Coronopus didymus*, *Lepidium Draba*, and *Senecio squalidus*, which first appeared in 1902. A few local names, new to us, are given: "Bruise-herb," *Glaucium flavum*; "Kiss-me-quick," "Convict-grass" and "Prince of Wales's Feathers," *Kentranthus ruber*; "Sour-dogs," *Rumex Acetosa*.

A new Flora of Shropshire is being prepared under the direction of the Caradoc and Severn Valley Field Club. It will be published by subscription, the price to subscribers being 10*s*. 6*d*. The preparation of the work was inaugurated in 1894, but nothing has so far been published. The volume will include ferns, mosses and hepatics, and the introduction will contain notices of former Shropshire botanists, of the physical features of the botanical divisions, of the geology and of the meteorology of the county. Communications regarding the Flora should be addressed to Mr. E. S. Cobbold, Church Stretton, Salop.

We quote the following from *The Standard*:—"The Cape Peninsula and other districts in the Western Province of the Cape Colony have long been famous for the beauty and variety of their heaths and wild flowers. In recent years an alarming diminution of these treasures has become apparent, and an Act was passed by the Cape Parliament in 1905 by which it was hoped that a reasonable amount of protection would be ensured. This expectation was not, however, realised, and regulations have been promulgated forbidding the uprooting, sale, and export of green ixia, pijpje, crassula, anemone, and several heaths. A close season is established for five different species of Disa, the beautiful flower which is found scarcely anywhere but on Table Mountain. The uprooting of the Silver-tree is also declared illegal. A stop has likewise been put to the destruction of the beautiful heath which is found in the Caledon district, plucking being prohibited for a term of three years. Coloured prints of all the prohibited varieties of heaths and flowers are to be exhibited at the various public offices in the districts concerned, so that the stereotyped excuse that the offenders 'did not know,' will no longer avail."

Mr. John Lane sends us a pretty volume on *The Old Gardens of Italy: How to Visit them*, by Mrs. Aubrey le Blond (5*s.*), the modest purpose of which is to guide the traveller to most of these delightful places, leaving it to larger works, of which a full list is appended, "to furnish him with fuller information and more numerous plans." The accounts of the numerous gardens described are necessarily brief; a useful feature is the indication of the conditions under which it is possible to visit them, when such permission can be obtained. The attractiveness of the book is greatly enhanced by the very numerous illustrations from photographs taken by the author, who has herself visited all the gardens pictured; on the other hand, its usefulness is greatly lessened by the absence not only of an index, but of anything in the way of a table of contents. Moreover, the title "Old Gardens of Italy" appears at the head of each page, to the exclusion of any information as to the subject treated; it will thus be seen that no precaution has been neglected to make the volume unconsultable.

The success of the International Phytogeographical Excursion through the British Isles in 1911 has led to the projection of a similar excursion in the United States in August and September next. The excursion will begin at Chicago on Aug. 1 and close at New York about Oct. 5; Nebraska, Colorado, Utah, California and Arizona will be visited for the investigation of the special features presented by these regions. Particulars may be obtained from Prof. H. C. Cowles, of the University of Chicago.

The *Journal of the Royal Microscopical Society* for 1912 contains (pp. 473–512) an elaborate paper on pollen by Lord Avebury, which is accompanied by two excellent plates.

Henry Groves

HENRY GROVES.

(1855–1912.)

(WITH PORTRAIT.)

At Mr. Britten's request I have undertaken to write a short memoir of my late brother, feeling that I am in a better position to do so than anyone else could be, having been associated with him in all his botanical work; but for that very reason, coupled with our close relationship, it is impossible for me to write of him as impartially as perhaps a biographer ought.

My brother was born in London on October 15th, 1855. Our father's family came from Gloucestershire, and our mother's —her maiden name was Stewart—from Scotland. Early in 1863, when my brother was seven years old, we removed to Godalming, in Surrey, and for about six years he attended Godalming Grammar School.

The Principal of the school, Mr. Peter Churton, who is happily still with us, though a good schoolmaster, had nothing of the dominie about him, being both in and out of school a friend rather than a master to his pupils. He was a good general naturalist, and used to take those of the elder boys who showed any interest in such things for frequent natural history rambles over the beautiful and diversified Lower Greensand and Chalk country with which Godalming is surrounded. He generously provided presses and drying and mounting paper to those who wished to preserve specimens of the plants collected, as well as other natural history apparatus. On several occasions he took my brother and one or two of the other boys away with him on summer holidays, visiting Hayling Island, the Isle of Wight, South Devon, and Cornwall. These excursions gave my brother an opportunity of seeing a great many fresh plants, besides widening his general outlook. He was, I think, Mr. Churton's favourite pupil, and I attribute his rather exceptional powers of observation, and his keen desire to get at the real meaning of any fresh facts or phenomena which presented themselves, to his early training in practical natural history; and the development of his character was, I feel sure, largely due to Mr. Churton's example and teaching.

In 1869 our father died, and our mother was left with three children and very slender means. It was necessary for my brother to begin to earn something, and when we had removed to London, he went, at the age of fourteen, to the office of a stockbroker friend of our parents, where he remained for about ten years.

In the very early seventies we made the acquaintance of the family of the late John Edward Sowerby, the botanical draughtsman, who possessed a number of botanical books. I remember we used to borrow the *English Botany* (ed. 2) a volume at a time, and make drawings and tracings of the plants which we did not know. The Sowerbys also gave us several books, among them

Hooker and Arnott, and Babington's *Manual*. Up to that time I think we had only Withering by which to try and identify plants. We soon began to make excursions in search of specimens to the London commons and other places near at hand. Wandsworth Common was a particularly happy hunting ground for us, in the days before it had been pared down and tidied up so as to conform to municipal ideas of beauty. At that time we were omnivorous collectors, especially delighting in water creatures and keeping several freshwater aquaria.

1874 was an important year with us. Up to that time we knew scarcely any other naturalists, but during the year we made the acquaintance, personally or by correspondence, of quite a number, some of them men of considerable standing. At the commencement of the year we both joined the South London Microscopical and Natural History Club, then a very flourishing association, and my brother soon became acquainted with Dr. Braithwaite, Professor Charles Stewart, and Mr. (now Dr.) Daydon Jackson. Through the medium of the exchange column of *Science Gossip* we got into correspondence with a number of British botanists, among them Mr. T. B. Blow, my brother's acquaintance with whom ripened into a lifelong friendship. At that time Mr. Blow was one of the most ardent of field botanists, and we were carried away by his enthusiasm to study many critical plants of which we had previously fought shy. To Mr. Blow we were also indebted for the personal acquaintance of one whom we always felt proud to have known, Hewett Cottrell Watson. In October, 1874, in company with Mr. Watson and Mr. Blow, we went for a short excursion in the neighbourhood of Thames Ditton, when Mr. Watson showed us several interesting plants. He invited us to call on him whenever we were in the neighbourhood, and a number of our Saturday afternoon rambles terminated at Thames Ditton. He always made us very welcome, and we owed much to his help and encouragement. I think one reason why he rather took to us was that we were not afraid to disagree with him, and he dearly loved an argument. In 1874, also, we first visited the Botanical Department of the British Museum, and made the acquaintance of Mr. (now Dr.) Carruthers, the late Henry Trimen, and our good friend Mr. Britten.

An early correspondent who helped us greatly was the late Andrew Brotherston, of Kelso, to whom we were indebted for specimens of a great many critical plants. We also learnt a great deal from the late Frederick Morgan Webb, an excellent critical botanist who was for some time living close at hand.

In 1875, thanks to the help and encouragement of our friend Mr. Bagnall, we commenced the study of the Roses, and my brother's discovery of *Rosa hibernica* on Barnes Common brought us the acquaintance of another great botanist, John Gilbert Baker. We also got into correspondence with Professor Crépin and M. Déséglise.

In 1875–6 we became acquainted with a large number of fresh plants. In company with Mr. Blow my brother had many walks in Hertfordshire and the adjoining counties, collecting many of the rarer eastern county plants. One day I remember they set out for Hitchin with the fixed intention of finding *Phleum phalaroides*, although it had not previously been recorded on that side of the county, and strangely enough before evening they had found the grass in great abundance on the borders of Hertfordshire and Bedfordshire, it being a new record for the latter county.

Our summer holidays from 1873 to 1879 were mostly spent at our uncle's near Southampton. This gave us the opportunity of exploring the New Forest and a great portion of the south of Hampshire, with occasional visits to the Isle of Wight. We turned up a number of plants not previously recorded for vice-county 11, and collected many notes for Townsend's *Flora* of the county, then in course of preparation. Our Hants botanising brought us another lasting friendship, that of the best all-round naturalist we have ever known, Mr. Ernest D. Marquand.

Up to 1877 we were quite as keen hunters of the land and freshwater mollusca as of plants. My brother was particularly quick at finding those tiny creatures the Vertigos, and our discovery of *V. Moulinsiana* as a British species brought him the personal acquaintance of Dr. Gwyn Jeffreys. My brother assisted Mr. Rimmer in the preparation of his *Land and Freshwater Shells of the British Isles*.

About 1877 we began to study the Characeæ. Mr. Hiern first suggested the group to us as a profitable field for work, but it was Professor Babington who supplied the principal incentive by kindly presenting us with several important papers on Characeæ, as well as the first two of Braun's Exsiccatæ. We also received much assistance from our esteemed friend Professor Otto Nordstedt. Our first note on these plants appeared in this Journal in 1878, when we recorded *Chara connivens* as a British plant. We collected Characeæ assiduously, and borrowed a large number of specimens for examination from friends and correspondents.

In 1879, owing to the death of his principal, my brother left the stockbroking business, and in the interval between this and his employment at Queen Anne's Bounty Office, he spent a good deal of time at the British Museum, making extracts of all he could find relating to the Characeæ, our object being in the first place to produce an account of the British species.

In 1880, when my brother was twenty-four, we published our little "Review of the British Characeæ," which came out in three instalments in the pages of this Journal. Had we waited a few years longer we should no doubt have avoided some mistakes, but as the greater part of the work and all the drawings were my brother's, I may perhaps be pardoned for saying that on the whole the "Review" was a fairly satisfactory piece of work, and I think did something to stimulate the study of the group in this country. From time to time for many years we published supplementary notes giving extensions of distribution, &c., and describing the several fresh species added to the flora, my brother supplying the illustrations of the latter. In 1880 Henry revisited Cornwall, meeting the two veterans John Ralfs and William Curnow.

In 1881 we launched out in another direction by describing *Spartina Townsendi* and *Rosa tomentosa* var. *Woodsiana.* I well remember the late Rev. W. W. Newbould shivering at our audacity, evidently thinking it scarcely decent for young men to describe a new British plant without some first rate botanist like the late William Borrer having viewed it *in situ* to see that it was all right!

In 1882 my brother was placed on the regular staff of Queen Anne's Bounty Office, having for about three years been employed as a supernumerary in the reorganization of the Muniment Department, where his love of order and a certain fondness for antiquarian research made the work interesting. In later years he was employed in other departments, and at his death was one of the seniors in the Office.

In 1883 he made his first acquaintance with mountain plants. We had a glorious fortnight together on the Breadalbane Hills, staying at the sheep farm at the foot of Ben Laoigh. He paid many subsequent visits to Scotland, mostly to the Breadalbanes and Cairngorms, in the latter case staying at Rothiemurchus with our friend the Rev. D. McDougall. He also on several occasions visited the Welsh mountains.

In 1884 he became Secretary of the South London Microscopical and Natural History Club, and retained that office until the Club was dissolved in 1897.

For some years we had been collecting Characeæ extensively with a view to issuing fasciculi of the British species, and in 1892 we brought out the first of these, making up fifty sets of thirty numbers. My brother contributed the larger proportion of the specimens. He was a careful and indefatigable collector, particularly of the water plants, and paid many visits to the Fen country, the Norfolk Broads, and other districts, in search of them.

Our mother, though not a botanist, took the keenest interest in our pursuits, and, as well as our artist sister, helped us greatly in laying out and drying specimens. When there was a big haul of Characeæ and hundreds of specimens to be floated out in a limited time, pans and dishes pervaded the house, and all hands turned to the work.

In 1892 we both visited Ireland and enjoyed a positive feast of Characeæ, first in Wicklow under the guidance of Mr. R. M. Barrington, then on the fine Shannon lakes with the late Mr. H. C. Levinge, afterwards in Galway, and finally at Killarney. The sight of *Chara tomentosa* and *Nitella gracilis* growing in quantity, and the finding of *N. tenuissima* (new to Ireland) in two provinces, were the great botanical delights of this holiday.

My brother became a Fellow of the Linnean Society in 1892, and served on the Council from 1899 to 1902, and again in 1911 to the time of his death. His broad knowledge of financial matters and his general level-headedness rendered him a useful councillor. In this connexion I may quote from a letter written to me after his death by Dr. Scott, the former President:—"I had a great regard for your brother, whose vigorous mind and strong straightforward character made him a most valuable colleague and friend. No one was of more service to the Linnean Society."

In 1896 Henry married Miss Bolton, and they had one daughter, now aged fifteen.

In 1900 we brought out our second fasciculus of *Characeæ*, to which our friend Canon Bullock-Webster contributed a large number of specimens.

In 1904 the ninth edition of Babington's *Manual* was published. Several years before, out of regard for the late Professor, and rather than that such an invaluable book should go out of print, we reluctantly undertook the task of editing it, with the limitations explained in the preface. We should gladly have left the work in other hands, as we felt that for some time we had been getting out of touch with British botany generally, besides having too little leisure to do the work as it ought to have been done. However, as no one else seemed to be forthcoming, we did the best we could with it.

In my brother's later years other interests to a great extent crowded out botany, and the limited portion of his leisure left for it was devoted almost entirely to the study of the Characeæ, especially those of extra-European countries. He prepared many hundreds of slides of these plants for microscopic examination, which represented no small amount of labour, considering the draggled apologies for specimens of which so much of the available material consists. He also made micro-photographs of the membranes of the oospores of a large number of species.

In 1907 he became a Trustee of the South London Botanical Institute. Though he could not quite share Mr. Hume's optimistic views as to its regenerative mission, he had great hopes for the future usefulness of the Institute.

In 1909 he visited the South West of France, and, in company with Canon Webster, explored some of the lakes in the Landes, collecting a large series of specimens of Characeæ. This was the only occasion he botanized abroad, his other visits to the Continent being confined to the towns.

In 1910 Henry went to Brussels for the International Botanical Congress, acting as one of the delegates of the Linnean Society. He attended the section which dealt with nomenclature, the problems of which had a particular interest for him. He always advocated uniformity of practice, and was in favour of changes where they tended toward ultimate stability, having scant patience with those who opposed them merely on the ground of inconvenience to the existing generation. In this, as in larger matters, he was thoroughly public-spirited and had no sympathy with opportunists, or with those who set their own interests before the good of the community.

In 1911 we contributed an account of the Characeæ to Professor Urban's *Symbolæ Antillanæ*. This was our most ambitious undertaking as regards foreign Characeæ, and we hoped to have followed it up with similar papers on the species of other parts of the world.

On the 2nd November, 1912, having just completed his fifty-seventh year, my brother died, after a long and wearisome illness borne with characteristic courage and patience. He was of medium height and strongly built, and until recent years had particularly good health. Our portrait is from a group taken by the late Mr. J. Guardia, and enlarged and adapted for publication by our friend Miss Charlton.

At school Henry was fond of athletics, but, like many widows' sons, as very young men we took life rather seriously and spared little time for amusements. Later on my brother took to lawn tennis, which, as well as Badminton, he played up to the commencement of his last illness. He was always fond of rowing, and it was partly owing to this that we were attracted to the study of aquatic plants.

In his earlier manhood my brother was a keen field botanist, and knew a great many critical species. Of late years he used to say he had forgotten all the British plants, but with a few minutes' examination of a doubtful specimen his knowledge revived, and his judgment was, I think, particularly sound. With the ticketing of varieties which has so great an attraction for some botanists he had no sympathy. If he knew a species and the directions in which it varied he was quite satisfied. On the other hand, he was much interested in discovering the causes which had brought about any form or state, and was quick in detecting abnormality in specimens sent for determination. As regards the work done by our botanical "firm," he was always the predominant partner.

Though my brother did not produce a large number of finished drawings he was an excellent draughtsman, and was, I think, particularly successful in "erecting" a dried specimen into the semblance of life. His plates of *Nitella Nordstedtiana* and *N. hyalina* in this Journal, and that of *N. dictyosperma* in the *Journal of the Linnean Society*, are among the best representations of plants of this genus which have been produced. The only non-botanical drawings of his which have been published were the beautiful plate of *Vertigo Moulinsiana* in the *Transactions of the Hertfordshire Natural History Society*, and the representations of the genus *Vertigo* in Rimmer's book.

Though by no means lacking in a sense of the beautiful, all forms of beauty did not appeal to him. He always put truth first, and a romantic poem or an imaginative painting had no charm for him. He was not a great reader, especially latterly, but had a particularly retentive memory for what he had read.

In later life especially, my brother was essentially a man of affairs, one whom it seemed natural to put on committees, to appoint as a trustee, and for his relatives and friends to turn to as a general counsellor. His knowledge of finance and property, his shrewd common sense and insight into human nature, his cool judgment and his ready sympathy eminently fitted him to give advice in almost any difficulty, and he spared neither time nor trouble when his help was needed.

My brother always took a keen interest in politics. In his young days he was a Liberal, and I remember at our Church Debating Society we were, in point of numbers, always on the losing side, sometimes I think forming a compact minority of two! About 1886, when the Liberal Party split up, he went with the moderate section, and in later years must be classed as a Conservative. Though in a marked degree he "loved his fellow men," he had little sympathy with the ideals of modern democracy, which to his robust common sense mind appeared crude and unpractical; while a Socialist was to him either a fanatic, a visionary, or one who coveted his neighbour's goods. My brother used thoroughly to enjoy a parliamentary election. All his fighting instincts came out on such occasions, and he was an invaluable helper on polling days, his genial, persuasive manner and quick grasp of the personality of the man he had to do with standing him in good stead in bringing up the unwilling voter. He was not a fluent speaker, but was particularly quick in seeing a fallacy in an argument, and was never carried away by the glamour of oratory.

Though he was always a member of the Church of England, his religious views were extremely broad. He had a great affection for Westminster Abbey, and for a great many years acted as steward for some of the services there.

Of his more intimate personal qualities I cannot speak here; suffice it to say that even I, who knew him so well, was surprised to discover after his death what a large number of people there were, in many different stations in life, who regarded him with evident affection as well as esteem, showing how widely and profoundly he is missed.

J. G.

FURTHER NOTES ON *EPILOBIUM* HYBRIDS.

By R. H. Compton
(Botany School, Cambridge).

The artificial *Epilobium* hybrids previously described have been grown on and, for the most part, preserve the characters attributed to them.* Since then other artificial hybrids have been cultivated in my garden on a light river-gravel and lias soil at Tewkesbury; and these can now be described provisionally, for the first time, in two instances, so far as I know, from authentic, experimentally produced fresh specimens.

A study of the literature of hybridology in this and other genera, together with an examination of herbarium material, has convinced me that the experimental method is not only not superfluous as an adjunct to field and herbarium work, but that it is essential to remove the confusion and vague speculation which are so rife in this part of the subject, and which have assisted perhaps more than anything else in bringing the study of plants in the field into disrepute among specialists in other branches of botany.

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* See Journ. Bot., 1911, p. 158.

E. ADNATUM Griseb. f. STENOPHYLLA Hausskn. ♂ × E. HIRSUTUM Linn. ♀.

This hybrid (*l. c.* p. 161) keeps quite constant as regards essential features, but shows a striking amount of variation in vegetative characters, especially among the young spring shoots. Some of these are much more slender than the main stems, and the leaves are narrower, relatively longer, and more deeply toothed: these characters are not permanent, however, and cannot be regarded as indicating bud-sports.

E. HIRSUTUM Linn. ♀ × E. MONTANUM Linn. ♂.

This cross was made in 1909, and the two plants which resulted have been propagated by division and kept under observation during three summers, 1910–1912. Dried specimens of this and the two following artificially produced hybrids are being distributed through the Botanical Exchange Club. This is perhaps the most remarkable of the *Epilobium* hybrids which I have grown; it is quite unlike what would be prophesied to occur from its parentage if the method of intermediates were adopted; and in fact the herbarium specimens and exsiccata which I have seen labelled *E. hirsutum* × *E. montanum* are quite distinct from the experimentally produced hybrid. Haussknecht* identifies the plant known as *E. purpureum* Fries as this hybrid, rejecting the opinions of earlier authorities; viz., Fries, who had named *E. purpureum* a plant which Haussknecht considers to be *E. palustre* × *E. roseum*, in addition to another plant identified as *E. hirsutum* × *E. montanum*; and Nyman, who thought *E. purpureum* was possibly *E. montanum* × *E. tetragonum*. The description given by Haussknecht agrees fairly well, so far as it goes, with my artificially produced *E. hirsutum* ♀ × *E. montanum* ♂, and it seems probable that his identification of *E. purpureum* is correct, though there are certain discrepancies. I have not seen specimens of *E. purpureum* Fries, but I have no hesitation in saying that the large-flowered plants with ovate woolly leaves labelled *E. hirsutum* × *E. montanum*, which I have seen in English herbaria, are wrongly identified.

My two plants during their first year (1910) showed a remarkable feature which has been repeated in 1911 and 1912; this was the production of two kinds of shoots as follows:—

(i) The first stems to appear from the rosettes are slender and twiggy, bearing comparatively closely set small lanceolate leaves, 4–5 cm. in length × 1 cm. broad; these stems branch repeatedly,

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[*] *Monographie der Gattung Epilobium*, Jena, 1884, p. 63.

and a bushy little plant is produced 20–30 cm. high. The stems with their leaves are almost glabrous, less hairy even than *E. montanum* of the same height in the same situation. A slight down is present, however, the hairs being all short, non-glandular, and obliquely placed on the stem and on both surfaces and edges of the leaves.* The leaves are broadest about half-way along; they are usually fringed with small forward-directed teeth, but some are almost toothless.

(ii) Some of the shoots, usually appearing a little later than the small twiggy ones, grow much more luxuriantly—to a height of 45–60 cm. Their leaves are more distant and much larger, an average good-sized leaf being about 7–9 cm. long × 1·5 cm. broad; there is a slight tendency to become spathulate, the base of the leaf tapering very gradually and being almost without teeth; but accurately lanceolate leaves also occur. The stem is often somewhat flexuose, but hard and brittle. The whole shoot is covered with a fine down, somewhat more pronounced than in type (i), consisting of a mixture of erect glandular hairs with a few longer half-erect simple hairs. The general shade of green is also somewhat lighter than in the slender shoots.

These two types of shoot are possibly due to slight local differences in nutrition among the crowded rosettes; but they are of sufficient constancy to merit description.

(iii) In 1912 a third type of shoot was produced by two plants. This has the tall stature of type (ii), but differs in having the leaves more markedly ovate, broadest below the middle, and more deeply toothed; dimensions, 6–7 cm. × 2–2½ cm. The clothing of the stems and leaves is somewhat denser, consisting of mixed long simple and short glandular hairs. The most remarkable feature is, however, the relatively superior development of the flowers. (See below.)

This type (iii) is specially interesting because, so far as can be seen, it is identical with plants produced by the reciprocal cross, *E. montanum* ♀ × *E. hirsutum* ♂, which are flowering this year for the first time; types (i) and (ii) differ very markedly from the reciprocal cross. It is difficult to account for this at present, for several possibilities are open; the offspring of the reciprocal crosses may be normally distinct,† and type (iii) may be a bud-sport; types (i) and (ii) may be atypical and due to special conditions of growth, and so on the other hand may be type (iii). The sharpness of distinction between the three types of shoot is against the theory that they are simply due to ordinary fluctuating variation. In any case, the phenomenon should be a warning against too hasty conclusions that reciprocal crosses give different results.

One of the most curious features of this hybrid relates to the flowers. In shoots of types (i) and (ii) the buds remain extremely short and slender, large examples not exceeding 8 mm. in total length. There is no distinguishable pedicel, and the calyx is only about 1½ mm. long. When examined the bud is found to contain four very small membranous bilobed petals, eight almost completely aborted stamens with minute anthers, and a brown shrivelled style with four short appressed stigmas. The buds never open, but turn brown, dry up, and fall off at a touch. The whole structure is very inconspicuous, not usually exceeding half the length of its subtending bract.

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* Cf. *E. adnatum* f. *stenophylla* ♂ × *E. hirsutum* ♀. Compton, *l. c.* p. 161.

† Cf. H. de Vries, "Ueber doppeltreziproke Bastarde von *Œnothera biennis* und *Œ. muricata*," Biol. Centralbl. xxxi. p. 97, 1911; W. N. Jones, "Species Hybrids of *Digitalis*," Journ. of Genetics, ii. p. 71, 1912, &c.

During 1910–1911 only flowers of this kind were produced; but in 1912 the shoots of the new type (iii) bore flowers of a different appearance, and so did the offspring of the reciprocal cross. These flowers are much larger, though still not nearly so large as those of either parent; they just surpass the bract in length, some attaining 20 mm. The ovary is green and covered with a glandular down, and the calyx is 3–4 mm. long. The majority of the flowers do not open, but occasionally a flower protrudes from papillose stigmas which spread out at the tip of the bud, no other floral parts being exposed. Attempts to fertilise such flowers were made, and a few seeds were produced by the reciprocal hybrid when pollinated from *E. hirsutum*.

The production of these flowers on shoots of type (iii) is a marked decrease in the degree of sterility, a phenomenon which has frequently been mentioned in the literature.* Whether this process will go further in later years cannot be guessed.

The summer shoots die down in the autumn, leaving basal rosettes, which are small and compact, with ovate, slightly fleshy, glabrous, untoothed leaves, closely resembling the rosettes of *E. montanum*: there is scarcely any suggestion of the production of the elongated runners of *E. hirsutum*.†

The hybrids are, like the parents, susceptible to *Puccinia pulverulenta*.

The points in which Haussknecht's *E. purpureum* differs are as follows: (*a*) The capsule is described as 3–4 cm. long on a pedicel of 5–6 mm.; no such development has ever been observed on my plants, but it would be unwise to prophesy that it never will occur. (*b*) The stem is said to be "stielrund oder stumpfkantig durch den eine Strecke weit auslaufenden, eine flache Furche verursachenden Mittelnerv der Blätter"; no furrow has been noticed in my artificial hybrid. On other points the description of *E. purpureum* agrees with my plants, especially with shoots of type (iii).

E. MONTANUM Linn. ♀ × E. PARVIFLORUM Schreb. ♂.

The cross was made in 1911, and I had fourteen plants flowering and forming good capsules in 1912; all were uniform, except for slight differences in the shade of the petals, some being lighter, some darker rose, the darker coloured flowers being borne on plants of slightly darker foliage; a similar variation being also met with in *E. montanum.*

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* Cf. R. Wettstein, "Ueber sprungweise Zunahme der Fertilität bei Bastarden." Wiesner Festschrift, p. 368, 1908.

† Cf. *E. adnatum* f. *stenophylla* ♂ × *E. hirsutum* ♀. Compton, *l. c.* p. 161. Also *E. hirsutum* ♀ × *E. parviflorum* ♂ (below).

The rosette leaves are oblong-ovate, obtuse, some being relatively shorter and approaching those of *E. montanum*: the ones formed in the autumn are glabrous and shining, the spring leaves being hairy. The plants grow to about 90 cm. high; they are copiously branched and flower profusely. The stem is terete; where it is slightly decumbent adventitious roots are produced. The leaves are ovate-lanceolate, mostly opposite and connate, rounded at the base, but not at all cordate and not so broad as in typical *E. montanum*; the large leaves towards the base of the stem are 8–9 cm. long × 3½–4 cm. broad, broadest at one-third of their length from the base; the upper leaves are of a similar shape but smaller. The leaves are toothed, not so deeply as in *E. montanum*, but much more than in *E. parviflorum.* The general aspect of the plant is a dull light green, owing to the dense short down with which it is clothed. At the base this consists of simple hairs, larger than those of *E. montanum*, shorter than those of *E. parviflorum*; in the inflorescence there are many glandular hairs mixed with the simple ones, and the latter are set obliquely or appressed. Leaves and stem are alike in this character, which is, on the whole, similar to *E. parviflorum.* The flower-bud is 3½ mm. long × 2 mm. in diameter, oval, scarcely apiculate, with glandular and simple hairs, in general appearance most like that of *E. parviflorum*; the pedicel is 5 mm. long; the ovary 2½–3 cm. long, square, furrowed, with much oblique simple and glandular down. The calyx is divided to two-thirds of its length, the segments slightly incurved (cf. *E. parviflorum*). The petals are elliptical (as in *E. parviflorum*), of the same length as in *E. montanum* but broader, notched. The anthers produce good pollen. There are four stigmas which spread out, but do not roll back. The capsule is 6–7 cm. long on a pedicel of 2 cm., and contains a few good seeds, but most of the ovules are abortive.

Haussknecht (*l. c.* p. 79) gives a description of this hybrid, which he himself produced experimentally, both reciprocal crosses being made and the offspring being found identical: "wenigstens fühle ich mich nicht in Stande, die unbedeutenden Nuançen durch Worte auszudrücken" (*l. c.* p. 27). The description he gives accords well with my own plants. The F_1 may therefore be considered a well-known hybrid. It is probably also a frequently occurring plant, for Haussknecht gives many records, and since the Rev. E. S. Marshall turned his attention to *Epilobia* in Britain * several specimens have been recorded as this hybrid.

Since the F_1 appears to be fertile to some extent, it is to be expected that F_2 will show a large number of varieties; the analysis of this generation promises to be an interesting piece of work this summer, as it may be possible to isolate unit-characters—a result which would immensely simplify the task of classifying such a "variable hybrid" as the present.

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* Journ. Bot. 1889, p. 143; 1890, p. 2, &c.

E. HIRSUTUM Linn. ♀ × E. PARVIFLORUM Schreb. ♂.

The cross was made in 1911, and F_1, consisting of three plants, was growing in 1912.

As is to be expected, this hybrid has been reported frequently, the parents growing together very commonly and intermediates occurring with them. But as *E. hirsutum* and *E. parviflorum* are exceedingly variable species according to conditions of life, and as some of their forms closely resemble one another in certain particulars (*e.g.*, hairiness, shape of leaf, terete stem), the determination of a supposed hybrid is a matter of special difficulty. Moreover, as some of the ovules are apparently fertile, we have to consider not only F_1, but subsequent generations—a fact which may account for the reputed variability of this hybrid (apart from growth-forms).

Haussknecht's description (*l. c.* p. 64) of this hybrid was made apparently from wild specimens so identified; it accords so well in essential points with experimentally produced plants that it may be taken as correct. The colour of the flower is stated to be somewhat lighter than that of the common form of *E. hirsutum*; I find, however, that the two flowers are indistinguishable in colour.

The most important features of the F_1 may be subjoined:—

(*a*) The anthers are completely contabescent; the capsules are of a good size (5–6 cm. long), and contain a few good seeds through cross-fertilisation, though the great majority of the ovules abort.

(*b*) There are no long runners such as *E. hirsutum* produces.

(*c*) The clothing is of the type of *E. parviflorum*; *i.e.*, the plant is thickly beset with long simple hairs below, and with a mixture of long simple and short glandular hairs in the region of the inflorescence. *E. hirsutum* has the admixture of glandular hairs throughout.

(*d*) The flower is smaller than that of well-grown *E. hirsutum*, much larger than that of *E. parviflorum*, purple. (But many forms of *E. hirsutum* with smaller flowers occur.)

(*e*) The leaves are not so prominently toothed as in *E. hirsutum*, but much more so than in *E. parviflorum*. They are connate at the base but not decurrent.

Thus most of its characters are shared with *E. parviflorum*, and the only critical features are the size and colour of the flower, the intermediate toothing of the leaves, the emptiness of the anthers, and the semi-sterile ovules. I hope to study the offspring of the crosses F_1 × *E. hirsutum* and F_1 × *E. parviflorum* as well as some others this summer.

Some interesting points of comparison may be made between this hybrid and *E. adnatum* f. *stenophylla* ♂ × *E. hirsutum* ♀. In the former purple flower colour is dominant over rose; in the latter rose is dominant over purple. In the former the F_1 flowers are intermediate in size; in the latter small flowers are dominant. In both cases long runners are recessive.

The varying degrees of sterility in these *Epilobium* hybrids offer an interesting field for study, and cytological investigations are already in progress.

PARNASSIA PALUSTRIS VAR. CONDENSATA.

By J. A. Wheldon, F.L.S., and W. G. Travis.

As our previous paper (Journ. Bot. 1912, 254), describing the above-mentioned variety, has elicited some interesting comments and criticisms, it seems desirable to supplement it by the following notes, in which one or two points raised by correspondents can be dealt with, and further information given as to the ecology of the plant, its variability, and so forth.

Several correspondents have pointed out the occurrence of exceptions to the characters we attributed to the type and variety when contrasting them. We should have stated in our original description (*loc. cit.* p. 256) that the characters, proportions, &c., there cited are average ones, such as are found in typical well-grown examples. For instance, as regards the number of scapes, we quote one to three for the type, and four to twenty for the variety. We do not deny that the type has occasionally more scapes, but this is exceptional. Young plants of the variety in their early flowering period, or starved plants, may frequently be found with a single scape. On the other hand, very luxuriant examples have been seen bearing as many as forty scapes, but these also are exceptional, and correspond to examples of the type which bear a few more scapes than usual.

The habitat of the plant in the Lancashire dunes is very variable in character; and in response to local modifications of its environment the plant undoubtedly exhibits in certain respects a not inconsiderable range of variation. But however extreme these variations may be, they never obliterate, although they may weaken, some of the characteristic features of the variety. In no instance, however, have we seen the typical *Parnassia palustris* of the upland moorland districts either amongst the dunes or in their immediate vicinity. It may be of interest here to discuss more fully some of the modifications to which the dune variety is subject, and point out, as far as we can, their causes.

The "slacks," or wet hollows among the dunes, in which the plant grows, vary considerably in their edaphic and other ecological conditions, the controlling factor being the amount of moisture present. The most favourable situations for *Parnassia* appear to be among the spongy moss-cushions and low herbage in slacks where there is a liberal and fairly regular supply of water, and where the soil, to a depth of several inches, consists of sand with a large admixture of humus, due to the decay of mosses and other plants. Under these conditions the variety occurs as a moderately tall, thickly tufted plant, bearing a large number of flowers. In less favourable slacks, where the degree of moisture is slight and fluctuating, and the layer of decayed vegetation is consequently thin and scanty, such plants of *Parnassia* as occur are squat in habit, with fewer flowering stems, but the flowers are often remarkably large. The older slacks containing dense herbage, and especially those yielding thickets of *Salix repens*, supply other ecological conditions which modify the habit of the *Parnassia*. The plants here become "drawn up," being usually taller, having longer leaf-petioles, and the bract placed higher on the scapes. As the "drawing up" effect, of course, acts uniformly on both scapes and petioles, the leaves and bract maintain their relative positions, and do not become separated by a considerable interval, such as usually occurs in elongate specimens of the typical plant of the uplands. The variety is therefore still readily distinguishable, though its normal facies is slightly altered.

The size of the flowers, again, a feature which strikes the casual observer at once, has been remarked to be inconstant. The flowers do, as a matter of fact, vary a good deal in size, both under normal and abnormal conditions. Normally, the first flowers to open are always large, and they may continue to be so until a dozen or more have opened; by this time the earliest ones will have been fertilized, and the fruit will have commenced to develop. As the fruit ripens and becomes elevated above the younger flowers, the latter begin to show signs of diminution in size, accompanied by a reduction in the thickness of the scapes; and the plant ultimately becomes so exhausted that the latest blooms may be as small as in typical *P. palustris*. A similar decrease in the size of the flowers occurs naturally in many other plants in which the flowering period is protracted, and continues simultaneously with the formation of fruit. It is well exemplified in several varieties or subspecies of Pansies.

More abnormally, the flowers may be reduced in size by starvation, due to lack of nourishment. Sometimes the seeds germinate where the soil is little but loose sand. Or the plant may commence luxuriant growth in an inundated slack, and throw up many stems. A period of drought supervening while the flower-buds are still very young may dry up the slack, and leave the plant with an inadequate supply of moisture. The more stems the plant has, the less now is the prospect of its flowers attaining their normal size and beauty. We have seen plants when left thus in an exceptionally precarious situation with flowers about half the usual size, and of a sickly greenish-white colour, very different in appearance from the usual handsome white blossoms. Even then, the stout rigid stems, much divided crowns, and squat foliage, would be sufficient to indicate the sand-dune variety to anyone familiar with the plant.

That the var. *condensata* should so well maintain its indi-

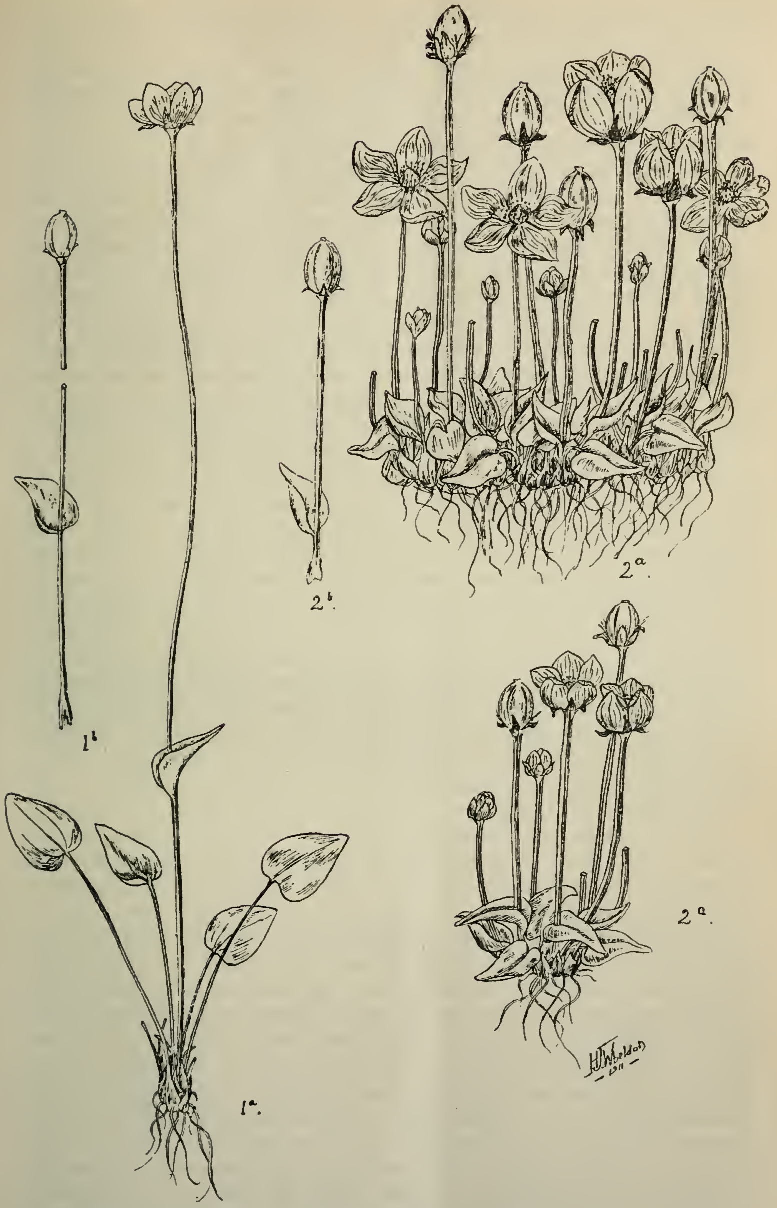

Fig. 1*a* and 1*b*, *Parnassia palustris* (type). Reduced.

Fig. 2*a* and 2*b*, var. *condensata*, Travis & Wheldon. About half natural size. The figures are drawn from dried specimens, and do not show the underground part of the plants quite accurately.

viduality under the very variable ecological conditions of the dunes indicates the attainment of a high degree of fixity of character. Notwithstanding the variations pointed out, we are still of opinion that on the dunes its diagnostic characters are never so obliterated as to render it unrecognisable. When the conditions of growth are normal, the plants may be seen growing in hundreds, and showing little or no variability.

Mr. Melvill suggests the desirability of cultural experiments in order to test its permanence and its status. As to its permanence under its proper environment, we adduced evidence in our previous paper of the long existence of the plant in its present form. The cultivation of all new varieties for several years before being described is, however, a counsel of perfection which has not always been observed in the past, and will probably never in the future become a universal rule. Such a proceeding would, perhaps, be most necessary where a few odd plants showing variation occurred amongst a crowd of normal ones. The var. *condensata*, to our personal knowledge, occurs in a long tract of country extending into three counties, and in no instance have we seen it assume the appearance of the type. It is not an easy plant to cultivate, but one of us has succeeded in getting it to seed in a plant-pot filled with sphagnum, standing in a dish constantly supplied with water. It did not thrive well, and never seemed really healthy, probably because of the absence of mineral salts. The flowers were small, but otherwise it retained the habit of var. *condensata*. Our plant came under the observation of the botanists taking part in the International Phytogeographical Excursion, and we have learned since putting together our previous notes that Prof. Graebner, impressed by its distinct appearance, took examples to grow in his Berlin garden. According to Mr. Druce, in the *New Phytologist*, up to date it had maintained its characteristic features. All these points afford strong presumptive evidence of its permanency.

The question of its status raises a very debatable subject indeed, on which each individual botanist may be expected to have diverse opinions. If we grant the existence of plants somewhat intermediate between the variety and the type, it will hardly be contended in these days that the existence of such connecting links extinguishes the claim of the former to varietal rank. If this were so, very few varieties at present widely accepted would stand the test. Mere erratic abnormalities and accidental pathological states have, even in recent times, been accepted as good varieties by eminent botanists. *P. palustris* var. *condensata* does not belong to that category. We regard it as a descendant of the typical plant, which became isolated in its present situation as thoroughly as if on an island, where it has undergone modification by the combined influences of the peculiar ecological conditions of the dunes, the mild climate, and constant inbreeding, until its divergences from the ordinary plant have become sufficiently marked and fixed as to render it recognisable as a variety.

We have seen the effects of a boreal climate in specimens from sands at Spiggie, Dunrossness, Shetland (W. H. Beeby), kindly lent to us by Mr. A. Bennett. These are very small plants with short scapes, small flowers, and microphylline foliage, the petioles being very elongate, and the bracts distinctly elevated above the leaves. The effect of a milder climate is seen in the luxuriant foliage and larger flowers of our variety, but any tendency to tall growth is severely checked by lack of shelter and exposure to strong winds. To this may probably be attributed the stoutness, great relatively, of the scapes and petioles. In attempting to gauge the influences which have determined the production of the var. *condensata*, its prolonged vegetative and flowering period, as compared with that of boreal and upland forms, must not be overlooked. Odd plants have been seen in flower by the second week of June, but the bulk of the blossoms are seen in July, and the latest ones may be found in open seasons towards the middle of October.

Mr. Bennett has shown us examples of the var. *condensata* from Largo Links, Fife, which were collected by Syme, and Mr. Druce has gathered it also on the Forfar coast, and at Whitepark Bay, Co. Antrim, thus considerably extending its range. We have seen no Continental examples, but Dr. Moss, in the *New Phytologist*, xi. 404 (Dec. 1912), says he has seen what he believes to be the same form in similar situations in Brittany; and he understands from Dr. Ostenfeld that it occurs in Denmark.

We may add that a good supply of specimens has been distributed through the Botanical Exchange Club, and that a plate figuring both type and variety will be found in the *Lancashire Naturalist* for August, 1912, which by the kindness of the editor we are enabled to reproduce.

SAGINA SCOTICA Druce.*

By G. Claridge Druce, M.A., F.L.S.

While ascending Ben Lawers on the hot sunny day of August 17th, 1911, with the members of the International Phytogeographical Excursion, this interesting *Sagina* attracted my attention; it seemed to me a new *Sagina*, which had somewhat the appearance of a petaloid pentamerous *procumbens*. As we proceeded up the hill the attention of the other botanists was directed to it, and it was observed in plenty over a range of from 1200 to 3500 ft. The consensus of opinion was against its being *procumbens*, but Dr. Ostenfeld, whose critical acumen carries great weight, suggested that it was a hybrid of *procumbens* with *saginoides*; Dr. Graebner, on the other hand, thought it was a distinct species and perhaps a form of *glabra*. I may say that, although I know Ben Lawers very well—this being my twenty-first ascent—I had never been on the hill so late in the year, nor on such a sunny day. Little time was at my disposal for anything like a thorough study of the plant, but from the descriptions in the European Floras and from comparison with a Tyrolean specimen labelled *glabra* by Huter, I recorded it as *S. glabra* var. *scotica* in New Phyt. 1911, 310. Subsequently Prof. Schroeter sent me a specimen of the true *S. glabra* from Switzerland, which proved that our plant could not come under that species; nor could I fall in with the views of Dr. Ostenfeld as to its hybrid origin, as I failed to find evidences of the presence of *saginoides*, and moreover the plant is fertile and widely spread. There is more to be said for the view taken by him later, when in New Phyt. 1912, 117, he gave reasons for identifying it with the *S. media* Brügg = *S. procumbens* × *saginoides*.

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* In Report Bot. Exchange Club for 1911, 14 (1912).

Meanwhile the plant had been cultivated in the Berlin Botanical Garden, and in July of last year Dr. Graebner wrote to me saying that "the Ben Lawers *Sagina* grows well and develops ripe fruits; I mean it is right to take it as a species, it is very characteristical, and it cannot be a hybrid." In answer to certain points I raised, he wrote: "It is impossible that *S. scotica* is a hybrid; we cultivate it with *S. saxatilis* (*saginoides*), but I cannot find anything of this plant in *scotica*; it is without doubt near *procumbens*, but a quite different plant. It has had good fruits." In cultivation it certainly becomes nearer *procumbens*, and this was the opinion arrived at by Mr. F. M. Webb, the Curator of the Edinburgh Gardens, whose specimens, I believe from Craig Cailleach, were first labelled as *saxatilis* or *Linnæi*; afterwards he said he felt inclined to name them *procumbens*: this latter view was my own first impression, and has been pertinently suggested by Dr. Moss (New Phyt. 1912, 402). On the other hand, there are specimens in Babington's herbarium which he first named *procumbens* and then altered to *S. saxatilis*.

In our British Floras—*e. g.*, Syme's *English Botany*, Hooker's *Student's Flora*, and Babington's *Manual*—references are made to *procumbens* being occasionally pentamerous, but even Syme says that the longer petals ("half as long as calyx") of *saxatilis* distinguish it. In *scotica* the petals are more than half as long and are usually as long and occasionally longer than the sepals, and although my experience is not wide enough to say if it is a characteristic point, yet I find on my specimens that the sepals do not spread from the capsule as in *procumbens*. The peduncles, too, are longer, and the leaves relatively longer and more attenuated than in *procumbens*, although in that species when it grows in moist shady places an approach to *scotica* may be observed. It is quite possible that *scotica* may have been before the describers of *S. procumbens* in our Floras, as in dried specimens the petals easily escape attention. Syme (E. Bot. ed. 3, ii. 121, 122) alludes to the difficulty in separating the pentamerous form of *procumbens* from *saxatilis*, and says the larger capsule is the only important character. From this statement it may be conjectured he had *scotica* before him; specimens of both *scotica* and *saginoides* are on the same sheet in Herb. Brit. Mus., gathered by him on Stuich an Lochan, Perth.

But there are still more interesting specimens in the same rich herbarium, collected by Robert Brown on the ground at great heights all over Ben Lawers in August, 1794. He had distinguished it as a new species and given it a manuscript name, and had appended the following excellent description, which may serve to diagnose *S. scotica*:—"Nimis affinis Saginæ procumbenti, differt præcipuè floribus quinquefidis, decandris, pentagynis, capsulis longioribus, staturâ majore, pedunculis longioribus et denique statione *alpina*."

S. scotica is not confined to Ben Lawers; I have seen specimens from Clova, Forfar! Glen Callater, S. Aberdeen! Glen Ennich, Easterness! Glas Thulachan, E. Perth, in *Herb. Mus. Brit.*; Craig Cailleach, *Webb*; Stob Choire an Easain (in *Herb. Mus. Brit.*); Ben Dothaidh! Ben Loaigh, Argyll, *Herb. Mus. Brit.* A large percentage of herbarium specimens of *saginoides* really belong to *scotica*, while a few specimens of *scotica* are also to be found on sheets of *procumbens*.

ARCTIUM PERSONATA Mill. non L.

By James Britten, F.L.S.

An accidental reference to Miller's *Gardeners Dictionary* ed. 8 (1768) resulted in a somewhat curious discovery which, so far as I am aware, has escaped the notice of botanists, British and other, and to which it may be worth while to call attention.

Of the genus *Arctium* Miller describes three species—*A. Lappa*, *A. Personata*, and *A. Tomentosis* (corrected later to *Tomentosum*). "The two first," he says, "are common weeds, growing on the sides of roads and footpaths in most parts of England. . . . The second is by many supposed to be only a variety of the first, but I have for several years sown the seeds of both sorts in the Chelsea garden, where they have constantly retained their difference, so may be allowed to be distinct species. . . . The third sort is not a native of England. . . ."

The description of the two first runs as follows:—

"1. Arctium (*Lappa*) foliis cordatis inermibus petiolatis capitulis majoribus sparsis. Burdock with heart-shaped leaves without prickles, having footstalks, and large heads growing scatteringly.

"2. Arctium (*Personata*) foliis cordatis inermibus, capitulis minoribus compactis. Burdock with heart-shaped leaves without spines, and small heads growing close together."

These two names correspond with those of the two species proposed by Linnæus (Sp. Pl. 816) and it may be assumed that Miller intended them to apply to the same plants. But apart from the fact that he does not (for either) quote the Sp. Pl. in accordance with his usual practice, it is obvious that in the case of the second he could not have so intended, for *A. Personata* L. (=*Carduus Personata* Jacq.) is described by Linnæus as "foliis decurrentibus ciliato-spinosis; radicalibus pinnatis: caulinis oblongo-ovatis." This latter description is given by Martyn in his edition of the *Dictionary* (1807) under *A. Personata*. Moreover, Miller says of his *A. Personata*: "The second is titled by Vaillant, *Lappa vulgaris capitulo minore*. Act. Par. 1718. Common Burdock with a small head"—this could not apply to *A. Personata* L.

It would seem from what has been said that Miller's name should be restored for one of the plants known collectively as *A. minus*. It is not a "still-born," for the reduction of *A. Personata* L. to *Carduus* having been universally accepted, the name is left free. The matter will no doubt be duly considered by Mr. A. H. Evans in the notes on the genus which he is preparing for this Journal in connection with the monograph he has undertaken for *The Cambridge Flora*.

NOTES ON *STATICE*.*

By C. E. Salmon, F.L.S.

X.—The Nomenclature of British Sea-Lavenders.

The following revision of the nomenclature of our British Sea-Lavenders has been rendered necessary by the International Rules of Botanical Nomenclature, according to which (Art. 45) the original name of a genus which is divided into two or more genera must be applied to that part of it which contains the larger number of species. When I adopted the name *Limonium*, following the practice then largely accepted (see Journ. Bot. 1901, 193), this Rule had not been promulgated, but it seems desirable to conform to it, and the following list is drawn up in accordance therewith:—

1. Statice Limonium L. Sp. Pl. 274 (1753), excluding vars. non Herb.; Hudson, Fl. Angl. 114 (1762), excl. vars.; Smith, Eng. Bot. ii. 102 (1793); Fl. Brit. i. 341 (1800), excl. vars.; Babington, Man. 244 (1843); Reisland und Brand in Koch. Syn. ed. 3, iii. 2187 (1903), excl. vars.

Limonium vulgare Miller, Gard. Dict. ed. 8, no. 1 (1768).
Statice maritima Lamarck, Fl. Fr. iii. 64 (1778), excl. var., non Miller.
Limonium commune Gray, Arr. Brit. Pl. ii. 296 (1821), excl. vars.
Statice pseudo-Limonium Reichenb. Fl. Germ. excurs. 191 (1831).
S. Behen Drejer, Fl. Hafn. 122 (1838).
S. scanica Fries, Mant. ii. 17 (1839).

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* See Journ. Bot. 1903, 65; 1904, 361; 1905, 5, 54; 1907, 24, 428; 1908, 1; 1909, 285; 1911, 73.

S. Limonium L. var. *Behen* Boiss. in DC. Prodr. xii. 645 (1848).
S. Limonium L. subsp. *Behen* Drej. var. *genuina* Syme, Eng. Bot. ed. 3, vii. 161 (1867).
S. Limonium L. var. *pseudo-Limonium* Rouy in Rev. Bot. Syst. i. 167 (1903).

forma PYRAMIDALIS, comb. nov.
S. Limonium L. var. *genuina* Boiss. in DC. Prodr. xii. 644 (1848).
S. Limonium L. subsp. *Behen* Drej. var. *pyramidalis* Syme, *loc. cit.*
Limonium vulgare Mill. var. *pyramidale* Druce in Journ. Linn. Soc. xxxv. 77 (1901).
S. Limonium L. var. *typica* Rouy, *loc. cit.*
Limonium vulgare Mill. forma *pyramidale* C. E. Salmon in Journ. Bot. xliii. 12 (1905).

Dr. L. M. Neuman told me, in 1903, that he calls this form in Sweden "f. *pinguissima*," but I have not seen the name published. Mr. F. N. Williams (Prodr. Fl. Brit. i. 438, 1910) considers *S. Limonium* forma *pyramidalis* to be identical with the *Limonium narbonense* of Miller (Gard. Dict. ed. 8, no. 2, 1768) but Miller's description and herbarium show that no British Sea-Lavender was intended by that name.

2. STATICE HUMILIS, comb. nov.
S. Limonium L. herb.
S. Limonium L. var. γ Huds. *op. cit.* 115 ; Smith, Fl. Brit. i. 341 (1800).
Limonium humile Miller, *op. cit.* no. 4.
L. commune Gray, var. *serotinum* Gray, *loc. cit.*
Statice bahusiensis Fries, Mant. ii. 17 (1839), excl. syn.
S. Limonium L. var. *longifolia* Henfrey in Phytol. i. 563 (1843).
S. rariflora Bab. Man. 245 (1843), non Drej.
S. bahusiensis Fries, var. *borealis* Fries, Summa Veg. Scan. i. 200 (1846).
S. Crouanii Lenorm. hb. ex Nym. Consp. 609 (1881).
Limonium rariflorum O. Kuntze, Rev. Gen. ii. 395 (1891).

forma NANA comb. nov.
S. rariflora Drej. Fl. Hafn. 121 (1838), partim.
S. bahusiensis Fries, var. *danica* Fries, Summa Veg. Scan. i. 200 (1846), partim.
S. bahusiensis Fries, forma *nana* Neuman, Sveriges Fl. 205 (1901).
Limonium humile Miller, forma *nanum* C. E. Salmon in Journ. Bot. xliii. 59 (1905).
L. humile Mill. var. *rariflorum* Williams, Prodr. Fl. Brit. i. 440 (1910).

Boissier in DC. Prodr. xii. 644, mentions *S. rariflora* Drej. as a "forma minor" of *bahusiensis*, but the expression is apparently used as a descriptive phrase and not as a name. It has been pointed out before in these pages (1905, 55) that Drejer's "*rariflora*" embraced really two plants, one a small state of *S. humilis*, the other a hybrid between this and *S. Limonium*. Hence the name *rariflora* cannot be used without confusion arising.

STATICE HUMILIS × LIMONIUM.
S. rariflora Drej. Fl. Hafn. 121 (1838), partim.
S. bahusiensis Fr., var. *danica* Fries, Summa Veg. Scan. i. 200 (1846), partim.
× *Limonium Neumani* C. E. Salmon in Journ. Bot. xlii. 362 (1904).
× *Statice Neumani* Rouy, Illus. Pl. Eur. Rar. 161 (1905).

3. STATICE LYCHNIDIFOLIA Girard in Ann. Sci. Nat. sér. 2, xvii. 18 (1842).
Limonium lychnidifolium O. Kuntze, Rev. Gen. ii. 395 (1891).
Var. CORYMBOSA Boiss. in DC. Prodr. xii. 647 (1848).
Limonium lychnidifolium O. Kuntze, var. *corymbosum* C. E. Salmon in Journ. Bot. xxxix. 193 (1901).

As far as our lists are concerned, only the variety has been observed in the Channel Isles, the sole "British" locality.

4. STATICE BINERVOSA G. E. Smith in Eng. Bot. Supp. 2663 (1830).
S. Limonium L. var. *β* Hudson, *loc. cit.*; Smith, Fl. Brit. i. 341 (1800).
Limonium commune Gray, var. *minus* Gray, *loc. cit.*
Statice cordata G. E. Sm., Cat. Pl. S. Kent, 18 (1829); non Willd.
S. spathulata Hooker, Brit. Fl. 145 (1830), partim; Bab. Man. 245 (1843); non al.
S. occidentalis Lloyd, Fl. Loire-Inf. 212 (1844).
S. Bubanii Girard in Ann. Sci. Nat. sér. 3, ii. 326 (1844).
S. Dodartii Bab. Man. ed. 3–4 (1851–56); non. Gir.
S. binervosa G. E. Sm., var. *occidentalis* Syme, *op. cit.* 164.
S. binervosa G. E. Sm., var. *intermedia* Syme, *loc. cit.* partim.
S. auriculæfolia Hook. Stud. Fl. 306 (1870); non Vahl.
Limonium occidentale O. Kuntze, Rev. Gen. ii. 395 (1891).
Statice occidentalis Lloyd, forma *elongata* and forma *compacta* Corbière, Fl. Norm. 480 (1894).
Limonium occidentale var. *intermedium* Druce in Journ. Linn. Soc. xxxv. 77 (1901), partim.
L. binervosum C. E. Salmon in Journ. Bot. xlv. 24 (1907).
Var. PROCERA Rouy in Rev. Bot. Syst. i. 162 (1903).
S. binervosa G. E. Sm., var. *intermedia* Syme, *loc. cit.* partim.
Limonium occidentale var. *intermedium* Druce, *loc. cit.* partim.
L. occidentale O. Kuntze, var. *procerum* C. E. Salmon in Journ. Bot. xli. 73 (1903).
L. binervosum C. E. Salm. var. *procerum* C. E. S. in Journ. Bot. xlv. 24 (1907).

Var. HUMILIS, comb. nov.
Statice reticulata Hooker, Fl. Scot. 97 (1821); non al.

S. spathulata Hook. Brit. Fl. 145 (1830), partim, non al.
S. Dodartii Gir. var. *humilis* Gir. in Ann. Sci. Nat. sér. 2, xvii. 33 (1842).
Limonium binervosum C. E. S. var. *humile* C. E. S. in Journ. Bot. xlv. 25 (1907).

5. Statice recurva, comb. nov.
S. Dodartii Bab. Man. eds. 5–8 (1862–1881); non Gir.
Limonium recurvum C. E. Salmon in Journ. Bot. xli. 67 (1903).
Statice binervosa G. E. Sm., var. *recurva* Rouy in Rev. Bot. Syst. i. 162 (1903).

6. Statice bellidifolia DC. Fl. Fr. iii. 421 (1805); Poir. in Lamarck Encyc. vii. 402 (1806).
S. reticulata Huds. Fl. Angl. 115 (1762); With. Nat. Arr. 193 (1776); Smith, Eng. Bot. 328 (1796), Fl. Brit. i. 342 (1800); Hook. Brit. Fl. 146 (1830) excl. pl. Hibern.; Bab. Man. 245 (1843); non L.
S. Limonium L. var. *bellidifolia* Gouan Fl. Monsp. 231 (1765).
Limonium reticulatum Miller, Gard. Dict. ed. 8, no. 9 (1768); Gray, Arr. Brit. Pl. ii. 296 (1821).
Statice caspia Willd. Enum. Hort. Berol. 336 (1809), et Herb.

Limonium reticulatum cited by Linnæus (Sp. Pl. 275, 1753) as of "Raj. hist. 396" is not a British species, and the name has been misapplied by later botanists, such as Miller, Hudson, Smith, &c., to indicate our plant.

The name *Limonium bellidifolium* of Dumortier's Flor. Belg. 27, 1827, which I used in Journ. Bot. (1907) 431, cannot be quoted as a synonym. The plant is not known as a Belgian species, and the reference given indicates that in all probability a state of *S. Limonium* was intended.

NOTES ON SWISS MYCETOZOA, 1912.

By Gulielma Lister.

The wet summer of 1912 afforded unusually favourable conditions for the development of Mycetozoa. M. Charles Meylan, who for the past seven years has made a special study of this group in the Jura Mountains, wrote on August 1st last, "Les myxomycètes sont extrémement abondants cette année." During a holiday spent in the neighbourhood of Lucerne, Meiringen, and Mürren in the last three weeks of August, my friend Miss Hibbert-Ware and I found fifty different species, some of which were in great abundance. This was in striking contrast to the poor success we had on the previous dry year, when a month's visit to the Tyrol yielded us only four specimens of common species, in spite of diligent search. The woods on the steep hills near Lucerne were chiefly of spruce, with some larch, and with an undergrowth of brambles, &c. About Meiringen and Reichenbach (alt. 1960 ft.) and on the neighbouring heights of Hohfluh (alt. 3440 ft.) the principal trees were limes, sycamores, hazels, and alders. Near Mürren (alt. 5390 ft.) our hunting grounds were steep spruce woods with an undergrowth of bramble, *Adenostyles*, *Mulgedium*, &c.; and also the exposed turf of the higher Alps, where dead scapes of *Cirsium spinosissimum* yielded abundance of several alpine forms of Mycetozoa.

In the following list of the species found the abbreviation L. indicates that the species was obtained near Lucerne, R. near Reichenbach, H. at Hohfluh, and M. near Mürren. A dagger precedes the names of those species not given in the lists of Swiss Mycetozoa published by Prof. Schinz * and M. Meylan,† and which, as far as I know, have not before been recorded for Switzerland.

Ceratiomyxa fruticulosa (Mueller) Macbr. L., M.

Physarum nutans Pers. L.—†*P. auriscalpium* Cooke. H. Two groups of both very shortly stalked and sessile sporangia were found on twigs and dead leaves.—*P. sinuosum* (Bull.) Weinm. L., H. — *P. contextum* Pers. R. Very abundant on leaves and twigs of lime.

Craterium minutum (Leers.) Fries. L., R.

Fuligo septica (L.) Gmel. L., R., M. Both yellow and white æthalia were found.

Leocarpus fragilis (Dickson) Rost. R., H.

Diderma effusum (Schwein.) Morgan. R.—*D. hemisphericum* (Bull.) Hornem. H., R.—*D. radiatum* (L.) Lister. H.

Diderma globosum Pers. R. Very abundant both in the plasmodium and fruiting stage, spreading over leaves, twigs, moss and lichen, and even over rocks, under shady trees. The sporangia are clothed with an egg-shell-like crust of granules of calcium-carbonate, which separates at a touch from the membranous inner walls. In these specimens the spores are not quite so dark or so large as in typical *D. globosum*, measuring 9 to 11 μ, instead of 11 to 12 μ or more; in this respect they approach *D. spumarioides* Fr., to which *D. globosum* is nearly allied.

Didymium difforme (Pers.) Duby. R., M. Abundant on dead *Cirsium* on the high Alps. — *D. clavus* (Alb. & Schw.) Rost. H. On moss on shady rocks. — *D. nigripes* Fr. L., H. — *D. melanospermum* (Pers.) Macbr. L., M. — *D. squamulosum* (Alb. & Schw.) Fr. L., H.

Didymium Wilczekii Meylan. M. Found in moderate abundance on dead scapes of *Cirsium spinosissimum* on the high Alps. Some of these gatherings are interesting for showing stages intermediate between this species and *Lepidoderma Carestianum* Rost. The typical sporangia are covered with a continuous layer of minute crystals of calcium-carbonate; other sporangia have the investing crystals clustered to form flat closely set scales; while other sporangia again have discoid scales consisting of closely compacted crystals scattered over the membranous or slightly cartilaginous wall. The last form cannot well be distinguished from *L. Carestianum* var. *Chailletii* (a variety in which the sporangium-wall is less stout than in the typical form). The dark rigid capillitium and dark rough spores, 12 to 13 μ diam., are alike in both species. Similar intermediate forms were collected by Herr O. Jaap, on old stalks of *Cirsium*, at the Furka Pass, in June, 1910, and appear as No. 93 in the fifth series of his published "Exsiccata," under the name *Lepidoderma Carestianum*. The sporangia in these, as in the Mürren specimens, sometimes have convex orange-coloured columellæ; this form has been described by M. Meylan as var. *flavescens* of *L. Carestianum* (in Bull. Soc. Vaud. xliv. 292).

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* See Schinz, *Die Myxomyceten oder Schleimpilze der Schweiz*, 1906.

† See Meylan, "Contributions à la Connaissance des Myxomycètes du Jura" in Bull. Soc. Vaud. xliv. 285 (1908), and xlvi. 49 (1910).

Mucilago spongiosa (Leysser) Morgan. R., H.

†LEPTODERMA IRIDESCENS G. Lister in Journ. Bot. 1913, tab. 524, figs. 1, 1*a* to *c*. M. Two groups of the sessile iridescent sporangia were found on sticks in a spruce wood on Sept. 1st. This is the first Swiss record. Since then M. Meylan has also found the species in the Jura Mountains; it has been recorded elsewhere from Bedfordshire and the North of Scotland.

†COLLODERMA OCULATUM (Lippert) G. Lister. A few small olive-brown sporangia were found associated with *Licea pusilla* Schrad. and *Trichia Botrytis* Pers. on old fencing in a spruce wood on Sept. 1st. A few weeks later M. Meylan obtained a considerable number of sporangia on dead wood at La Vaux, in the Jura Mts.; some were glossy olive-brown and had their walls completely invested with a layer of refuse matter and mucilage; other sporangia were purple-brown and shining with iridescent colours; in these the upper walls were entirely free from refuse matter. This species was first obtained in 1892 by Christian Lippert on dead wood brought from the Tyrol; within the last two years it has been found also in the North of Scotland, in Epping Forest, Essex, in Portugal, Japan, and New England.

STEMONITIS FUSCA Roth. L., H. Two gatherings made in the Gutsch woods above Lucerne have rather ill-developed sporangia and spores marked with a continuous reticulation of shallow raised bands; they therefore belong to the var. *trechispora*; this style of spore-marking seems to be often associated with imperfectly formed capillitium in *S. fusca*. In the Hohfluh gathering the sporangia are stunted and barely 2 mm. high; the spores are marked with typical close spinulose reticulation.

S. ferruginea Ehrenb. L.

Comatricha nigra (Pers.) Schroeter. L., H., M.

COMATRICHA PULCHELLA (Bab.) Rost. var. *tenerrima*. M. On decaying scapes of *Adenostyles alpinum* in spruce woods. In one specimen the pale reddish-brown capillitium threads are combined to form a complete though uneven net on the surface of the sporangium; in another the capillitium threads are less flexuose, and end in free tips on the surface; the two specimens are (alt. 3440 ft.) the principal trees were limes, sycamores, hazels, and alders. Near Mürren (alt. 5390 ft.) our hunting grounds were steep spruce woods with an undergrowth of bramble, *Adenostyles*, *Mulgedium*, &c.; and also the exposed turf of the higher Alps, where dead scapes of *Cirsium spinosissimum* yielded abundance of several alpine forms of Mycetozoa.

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Trichia favoginea Pers. L. — *T. persimilis* Karsten. L., H., R., M.—*T. affinis* De Bary. L.—*T. contorta* (Ditmar) Rost. H.

TRICHIA CONTORTA var. ALPINUM R. E. Fries. M. The inconspicuous vermiform sporangia of this robust alpine form were abundant on the dead scapes of *Cirsium spinosissimum* on the alps above Mürren, and were also found on old herbaceous stems in the spruce woods. They vary in colour from reddish-brown to black; in the brown sporangia the wall consists of a single layer without external deposits of refuse matter, and is often embossed by the impression of the spores; the black sporangia have a stout, cartilaginous, rich brown outer wall, thickened with deposits of refuse matter, and an almost colourless membranous inner wall. The elaters are bright yellow; the spores measure from 15 to 18 μ diam. The crystals of calcium-oxalate which are usually present among the deposits on the sporangium-walls of typical *T. contorta* do not seem to occur in the var. *alpinum*.

Trichia decipiens (Pers.) Macbr. R., M.—*T. Botrytis* Pers. M. —*T. Botrytis* var. *lateritia*. L.

HEMITRICHIA ABIETINA (Wigand) Lister. M. Found on old fencing and on a fir-stump. In some sporangia the capillitium is marked with three or four spiral bands, in others the threads have only two spirals; the latter number occurs most frequently.

†H. LEIOTRICHA Lister. H. A single group of about five sporangia was found on a fallen twig. The capillitium in this specimen is practically that of a *Trichia*, consisting of very long sparingly branched coiled and twisted threads which are either free or attached at one end to the sporangium-wall; the four spiral bands with which they are marked are distinct but not prominent.

Arcyria cinerea (Bull.) Pers. L., H.—*A. incarnata* Pers. L.

Perichæna chrysosperma (Currey) Lister. H.

†PERICHÆNA VERMICULARIS Rost. M. Found on old thistle-stalks on the alps. Three sporangia only were found; their walls are strongly papillose; the capillitium is sparingly developed.

Margarita metallica (Berk. & Br.) Lister. M. The sporangia were found on chips in a spruce wood. They form curved plasmodiocarps, and are lilac-grey in colour with iridescent reflections.

AUTHORSHIP IN THE 'AMŒNITATES ACADEMICÆ.'

By B. Daydon Jackson, Ph.D., Sec.L.S.

Few subjects have been more discussed by librarians and bibliographers than the authorship of many of the academical theses and dissertations which are met with in large collections of books. I may quote a sentence from Mr. H. B. Wheatley's volume *How to Catalogue a Library* :—"In the 'title-taking' of these dissertations the difficulty is not in their subjects, which are sometimes confined to a single word, but it is in the choice of their author's names: whether the præses, the respondent, the proponent, or defendant is to be chosen."

In many cases there can be no room for doubt, as in the present day, when each thesis may be taken to be the work of the graduate who maintains it. But formerly in Germany and Scandinavia, the præses ranked as author, a practice continued in Sweden almost to our own times. The difficulty arises when some novel ascription is made in the title of the dissertation, when, in place of the opposed præses and respondens, some such title as "auctor" or "auctor respondens" makes its appearance, or still more embarrassing when we find such as these:—"Quam deo ter optimo maximo Præside ex auctoritate D. Rectoris exam. subjicit J. G. W.," or "Quam præside summo numine ex auctoritate D. Rectoris subjicit . . ."

My object is, however, not to discuss the subject as a whole, but to confine my remarks almost exclusively to the dissertations which were printed with the name of Linnæus as præses, and subsequently reissued in the volumes of the *Amœnitates Academicæ*. If these are held to be the work of the præses, they must be quoted as of Linnæus, with all the authority attaching to his name, but if, as some of recent years have held, the respective respondents are the actual authors, then the names of many obscure individuals will stand as sponsors in place of the hitherto reputed author.

Prof. T. M. Fries has given an account of these dissertations, and it will be best to give his statement concerning them. According to the existing regulations, down to 1850, everyone who wished to be examined in the faculty of philosophy had to dispute *pro exercitio*, and, after the examination, another thesis *pro gradu*, before the degree was conferred. The former in most cases was entirely or chiefly the work of the professor, who took the chair at the function as præses, and also assumed the lion's share in defending the thesis. On the other hand, the respondens took but little part in the composition or defence. To determine how many of these one hundred and eighty-six dissertations entirely proceeded from Linné's pen is impossible. That such was the case with certain essays, we have his own word, and their contents also show that; others, such as Löfling's *De gemmis arborum*, Söderberg's *Pandora et Flora Rybyensis*, Tillæus's *De varia febrium intermittentium curatione*, are, on the contrary, exclusively the result of the respondent's own study and observations. But even these have certainly to some extent received the stamp and imprimatur of Linné, who completed and corrected them throughout before they were printed.

As to what happened in most cases, one of his pupils, J. G. Acrel, supplies the information. "All disputations," he relates, "he wrote by dictating, partly in Swedish, partly in Latin, which it was the task of the respondens to reduce to method and order; and although he did not trouble himself about the Latinity in them, he took care to intimate his opinion as to whether they were well written or the contrary. To write an essay thus needed scarcely three hours, for it was for him nothing but a lecture on the subject, which the respondent took down." But that all could not be so easily dealt with is apparent from even a hasty perusal, and often they demanded from the respondent a fair amount of trouble and knowledge, though the most requisite thing was to provide a passable Latin translation. It was also the custom that he should appear to be the real author and to add some flattering phrases praising the learning and acuteness of the præses.

In the library of the Linnean Society there are many duplicate copies of the original theses, corrected and annotated by Linnæus himself, and the later revision is that printed in the *Amœnitates Academicæ*. That Linnæus regarded most of these exercises as his own may be learned from such instances, as where he cited plants from *Centuria 1 (–2) Plantarum* in the second edition of his *Species Plantarum* as first described in those parts, but without naming any author whatever. He plainly looked upon these productions as entirely his own.

There is, however, another set of dissertations which must have required a large amount of patience and reference on the part of the respondent, such as the *Flora Anglica* of 1754, soon followed by *Fl. Alpina*, *Fl. Palæstina*, and *Fl. Monspeliensis*, 1756, chiefly based on comparing certain published Floras with the recently issued *Species Plantarum*. After a short interval we find also *Fl. Danica*, *Fl. Capensis*, *Fl. Jamaicensis*, and *Fl. Belgica* (excluding *Fl. Akeroensis* and *Fl. Rybyensis*). The *Flora Anglica* is a list of names, with references to the third (Dillenius) edition of Ray's *Synopsis*, so that the name has to be established by a double reference, with the risk of a wrong number vitiating the result. *Fl. Monspeliensis* labours under the same defect, consequently when the *Index Kewensis* was in course of compilation, I was careful not to include any of the Floras above mentioned, though the dissertations on new genera and the *Centuriæ* were of course utilized.

We see, therefore, that the prevailing custom was for the præses to suggest, dictate, and correct the academic exercises of his pupils, and he therefore took them to be his own work. This point of view long prevailed in Sweden. As an instance, I may mention the elder Agardh's *Aphorismi Botanici*, a volume of sixteen dissertations issued as the work of as many students, whose names appear on the respective title-pages. The work is divided amongst them, a sheet apiece, ending sometimes in the middle of a word, which thus enters into the compositions of two different authors. This is the best instance known to me as showing how completely the præses in this instance was the author.

If a further instance of this peculiarity were required, that might be cited of C. P. Thunberg and his *Museum Naturalium Academiæ Upsaliensis*, consisting of twenty-two parts, issued from 1787 to 1797; and his *Nova Plantarum Genera*, sixteen parts from 1781 to 1801.

SHORT NOTES.

Stellaria aquatica Scop. var. scandens Lej.—Mr. H. Stuart Thompson's reference (p. 48) to the occurrence in Switzerland of this plant with shoots four feet long reminded me that last October, while botanizing with Mr. V. Murray at Suleham, Berks., where he showed me *Azolla caroliniensis*, I noticed the above-named variety growing to a height of eight feet, in a damp wood, where it was supported by the surrounding vegetation: here also grew *Angelica sylvestris* and *Scrophularia aquatica* nine feet high. —G. C. Druce.

Sagina procumbens L. forma (Journ. Bot. 1912, 288).—The interesting form referred to by Mr. Turrill was described and figured by Baxter in his *British Phænogamous Botany* (iii. t. 199, 1837). It was found by the Rev. H. Davies, the author of *Welsh Botanology*, in 1817, near Beaumaris. This form flowered in the Oxford Botanic Garden on Aug. 22nd, 1836, and Baxter counted in one flower no less than forty-four perfectly formed petals, all of which in a fully expanded state occupied a circle of only one-tenth part of an inch in diameter.—G. C. Druce.

[Specimens of the plant from Davies's herbarium are in the National Herbarium, with the following note: "*Sagina procumbens flore pleno*! This variety I gathered on the green at Beaumaris in the summer of 1815. Each flower bears about thirty petals; *i. e.* from twenty-seven to thirty-two. H. Davies."—Ed. Journ. Bot.]

REVIEWS.

The Genus Iris.

The Genus Iris. By William Rickatson Dykes. With forty-seven coloured drawings by F. H. Round, one coloured plate of seeds by Miss R. M. Cardew, and thirty line drawings by C. W. Johnson. Cambridge: At the University Press. 1913 [Dec. 1912]. Folio, half-leather, pp. 245. Price £6 6*s*. net.

This very handsome volume appeals alike to the art lover, the horticulturist, and the botanist. It is of course from the last standpoint that any criticism offered in these pages must be attempted; the others may be briefly dismissed, but will doubtless find fuller notice elsewhere. We must, however, pay tribute to the beauty and accuracy of Mr. F. H. Round's plates, which are in themselves sufficient to make the book a treasured possession; the treatment and colouring of the flowers and buds leave nothing to be desired—the green of the leaves is, we think, a little monotonous. The woodcut figures in the text are excellent, and Miss Cardew's figures of the seeds (which strike us as unnecessarily large) are admirably executed.

No assurance is needed as to Mr. Dykes's competence to speak with authority on all that concerns Iris cultivation; the fact that he has grown nearly all the species he describes is sufficient testimony to his skill as a gardener, and the observations scattered through the book, as well as his excellent introduction, show that he has adequately considered the bearings of the results of his experiments in growth upon the question of the limitation of species. He has, whenever possible, procured plants or seeds from the localities whence the types of the species were obtained; "seedlings of as many species as possible have been raised in order to determine the limits of their variability;" "in analyzing the results thus obtained, it has been impossible to avoid feeling how utterly the Mendelian laws have shaken the basis on which our ideas as to what constitutes a species were founded." As a result of his experiments and investigations the number of species recognized by previous monographers of the genus has been largely reduced, and relationships have been pointed out which may eventually lead to further reductions. The descriptions, evidently from living plants, are detailed and elaborate, although one notes in them just that absence of detail which in other respects mars the book; thus on p. 116 we read "filaments short, anthers longer than the filaments," and on the opposite page "filaments" [followed by a space], "anthers longer than the filaments"—no measurements being given in either case.

So far, however, the book is satisfactory enough, but it is to be regretted that in its botanical aspect it is open to criticism which a greater familiarity with modes of book-preparation would have rendered unnecessary. Mr. Dykes acknowledges "invaluable hints as to method" from Dr. Stapf; these, however, if sufficient, can hardly have been acted upon, for we do not remember to have seen a work of equal importance from which satisfactory "method" has been so entirely absent. We are at a loss to understand how the Cambridge University Press, with a competent man like Dr. Moss always at hand, can have allowed itself to issue a volume in which the aid of typography to the intelligent presentment of the text is so conspicuously ignored; this criticism, which no one who opens the volume and who knows how books should be produced will consider too severe, we propose to justify later; at present we confine ourselves to the botanical and literary aspect of the volume.

We may preface our comments by saying that we have been through Mr. Dykes's book with the care to which its importance entitles it, and have noted for discussion a number of points upon which space will not allow us to dwell.

At the outset we note a certain absence of arrangement in details which, small in themselves, greatly affect the usefulness of a book. Thus the list of plates faces the introduction, but no reference is given to list or figures in the (in many respects excellent) index, so that one consulting that is left in doubt as to whether a species is figured or not. The notes on "The Literature of Iris" are disappointing. Among pre-Linnean literature, Clusius is practically the only author treated; we should at least have expected some account of the numerous species described and figured by Parkinson in his *Paradisus*. If it had been thought desirable to discuss the uses of *Iris* in folk-medicine, this should have been done more fully. One of the funniest slips we remember to have seen in any book is in the supposed quotation from Turner's Herball which runs: "Of Xyris or Spourghaurt; The vertues of the Dichebur," &c. Mr. Dykes has transposed "the vertues of the Dichebur" (*Xanthium*)—which appear at the top of the folio and are a continuation from the preceding—to below the name of Xyris, with the above curious result. We should have expected to find some account of the gradual bringing of the species into cultivation; even under the species themselves such information is lacking for the earlier introductions.

Mr. Dykes tells us that he confines his citations of specimens to those which he has himself seen, but he does not seem to have recorded all that have come under his notice, even when these are of considerable importance. For example, in the long list of "unidentified specific names" we find three from Miller's *Gardeners Dictionary*: *I. picta*, *I. sativa*, and *I. bicolor*. Miller's specimens of each of these are in the National Herbarium and must have passed through Mr. Dykes's hands.* Solander's type specimens of *I. cristata* in the National Herbarium are not referred to (the locality "prope Ohio" should have been added to the reference to Bartram's specimen), nor are those of *I. lurida* (also types) mentioned. This defect seems to prevail throughout the book, *e.g.*, the National Herbarium contains the types of Pallas's *I. flavissima* and a specimen from Kitaibel of *I. arenaria* W. & K., which Mr. Dykes unites with it; but the importance of these in determining the species is in no way indicated. Moreover, it may be pointed out that this limitation of records is likely to mislead; for example, the entries under Great Britain for *I. fœtidissima* are limited to Dorset, Isle of Wight, "Ventor" [Ventnor?], Loch Leven, and Godalming—in this order representing the Kew, Berlin, and Vienna herbaria, the last being cultivated by the author; "Gansange" is given as collector of the "Ventor" and Loch Leven specimens. The manner in which the references to plants, as well as to books, are printed is needlessly extravagant, but to this we shall return later. The abbreviations employed, so far as explained, are on pp. 1 and 20, those for books cited (which are often unsatisfactory—*e.g.*, "Hdk." for Handbook) are not given at all, so that the uninitiated may be puzzled by such extreme brevities as "J.L.S.", especially as he will not find the *Journal of the Linnean Society* under "J" in the bibliography, although the *Journal of the Royal Horticultural Society* appears under that letter. The bibliography itself might be improved; *e.g.*, the dates of the *Flora* of *British India* are rightly given as 1872-97, but the only part of the work referred to—the *Iridaceæ*—is dated 1892. The abbreviations are not infrequently misprinted—"Art." (p. 106) and "Crit." (p. 171) should be "Ait.," and "Trans. Hort. Soc. ser. II part iii. p. 115" should be "Trans. *Linn.* Soc. ser. II. *vol.* iii." The accidental checking of a reference raises doubt as to how far these are to be trusted; under *I. macrosiphon* (p. 43) "*I. californica* Leichtlin, The Garden, Aug. 14th, 1897" is cited, but the paragraph referred to is headed *I. macrosiphon* and the plant, which is figured as well as described, is stated by Purdy (op. cit. 1898, p. 1) to be *I. Purdyi*, although neither figure nor description is quoted by Mr. Dykes under that species.

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* Mr. Baker (*Handbook of Irideæ*, p. 12) places *I. picta* and *I. sativa* under *I. versicolor*: Miller's specimen of the former is not very satisfactory; the latter is named by Mr. Baker in the Herbarium *I. Pseudacorus*, to which Mr. Dykes doubtfully assigns it. *I. bicolor* Miller is not cited in the *Handbook*, but Miller's specimen agrees well with *I. sibirica*. Mr. Dykes places Miller's *I. maritima* under the species last named, but Mr. Baker rightly names it *versicolor*, although in his book he places the species under *sibirica*. We do not understand on what principle books or figures are cited; thus, under *Iris fœtidissima*, "O'Brien & Parkinson, Wild Fl. Undercliff" is quoted—the book also appears in the bibliography on the strength of this one reference—but such easily accessible books as *English Botany* and Curtis's *Flora Londinensis* find no place.

There is evidently ground for criticism in matters of nomenclature—for example, if the reductions indicated on p. 196 be accepted, the plant which stands (p. 196) as *I. sindjavensis* (1884) must take the specific name *Aucheri*, having been thus described under *Xiphion* by Baker in 1877. There are inconsistencies of citation—thus *X. Aitchisoni* stands as the first reference for *I. Aitchisoni* (p. 198), while *X. Stocksii* (p. 201) is rightly placed as a synonym; under the former the reference to Baker's *Handbook* is omitted. *I. Biliotti* (p. 175) should be *Biliotii*, and *I. palæstina* appears throughout as *palestina*. Here and there we find an odd suggestion—*e.g.*, on p. 172, where we read of *I. sambucina* and *I. squalens*: "Their history is not at all clear and we may perhaps be permitted to infer that Linnæus had some doubt as to their claim to specific rank from the fact that he did not include them in his first edition of the Species Plantarum"! On p. 215 Mr. Dykes points out an extraordinary blunder of Ascherson and Graebner (Syn. Mittel. Eur. Fl. iii. 514) in naming *I. juncea* "I. imberbis." Poiret named the plant "Iris juncea (nobis) imberbis, foliis junceis," &c., and the German authors have taken the first word of the description as the specific name! We are not convinced by the reasons given (pp. 145, 146) for dropping *I. biflora* L., and it does not appear that Mr. Dykes consulted the specimen in the Linnean Herbarium. *I. kumaonensis* is cited as published from "Wall. Cat. no. 5052," but this is not a valid publication; the next reference is to Baker's *Handbook* (1877); but the species was published by D. Don (who wrote the name "kamaonensis") in Proc. Linn. Soc. i. 8 (1838?) and in Trans.

Linn. Soc. xviii. 311 (1840, fide Dr. Jackson). A synonym for this is "*I. tigrina* Jacquemont MS." but why MS.? the name is published in Baker's *Handbook*, p. 24; "Winterbotham" is given throughout for Winterbottom. The same author is differently quoted; we have "Gawl," "Ker," "Ker Gawl," and "Ker-Gawl"—the latter two are incorrect, though the former may stand, as Ker changed his name to Gawler and published under both. The missionary after whom *I. Gatesii* is named is entered as "T. G. Gates" on p. 118 and as "G. F." on p. 227; Foster called him "F. S." and Baker "T. F."; we doubt whether the species is validly published in either of the books standing first in the citations. The inconvenient manner in which the book is printed makes it difficult to detect the new species, and the introduction does not call special attention to these. We note however as new *I. tenuissima* (p. 44) from California; *I. sikkimensis* (p. 44, t. 31) based upon the author's "*I. kumaonensis caulescens*" and "probably from Sikkim"—Mr. Dykes is not yet satisfied it may not be merely a hybrid; *I. mesopotamica* (p. 176); *I. montana* Nutt. (p. 91); and *I. histrioides* (p. 224, t. 46 f. 1)—the last already known as a variety and raised to specific rank on characters which seem rather slight. *I. montana* is based on a specimen so named by Nuttall in the National Herbarium; Mr. Dykes cites as a "synonym" "*I. pelogonus* Goodding in Coult. Bot. Gaz. xxxiii. p. 68 (1902)" but adds "their identification is probable but not quite certain;" should it be definitely ascertained, Goodding's name will of course stand.

One or two notes will interest British botanists. *I. versicolor* —which finds no place even in Mr. Druce's too comprehensive List—"has become naturalized in a disused lock on the river Calder in Yorkshire" (p. 81); "the pale ochraceous yellow unblotched form" of *I. Pseudacorus*, known as *Bastardi*, "was found growing in a field near Llanfairfechan in North Wales, and a certain proportion of seedlings of the golden yellow type are pale yellow-flowered [pale-yellow flowered?] forms" (p. 78).

It is, however, as has been indicated, in the printing of the work that there is most ground for criticism—such a combination of meanness with extravagance has never come under our notice. In such a book, each species should of course begin a page; here they follow each other with an entirely inadequate separation by space, and are rendered inconspicuous by being printed in faint small italic capitals, the initial of the genus only being prefixed. On the other hand, the wasteful method of printing the references seriously detracts from the appearance of the book and can serve no useful purpose. Not only does each locality occupy a line, but each collector in that locality: *e.g.* (p. 137):—

"Pesth, 1815, Kitaibel (B).
18—, Kováts (V).
18—, Richter (V).
18—, Schiffer (E).
1830, Martius (E).
1876, Poruten (E).
18—, Gyorgy (BM)."

The localities for *I. Sisyrinchium* printed in this manner occupy very nearly two whole pages! In the same way each part of the flower has a line allotted to it, even when it is not described: thus (p. 105):—

> " *Crests*, large triangular,
> *Stigma*,
> *Filaments*,
> *Anthers*,
> *Pollen*."

Book-references appear in similar fashion, even when the same author and the same work are quoted; we take from the same page:

> " Hance in Journ. Bot. xiii. p. 196 (1875)
> xiv. p. 75 (1876)."

It is unnecessary to point out the effect of this method on the appearance of a folio page.

Even more open to criticism is the typography of the volume. Every one knows how greatly reference to a book is facilitated by a judicious employment of the resources of type; this handsome work however is printed almost throughout in one font of lower case type and one of italics. The former is employed for text, book-references, localities, countries, and collectors' names; the latter for synonyms, names of species and varieties (except for heading of each), for parts of the plant (in Latin and English), headings of groups; the use of capitals (large) is reserved for headings of groups and (small) for the words "Plate," "Synonyms," and "Distribution"; clarendon appears only for the sectional name on page-headings. The heading of each species appears in the curious form:—

> " † ‡ *I. CLARKEI*
> (Plate V)
> Baker, Hdk. Irid. p. 25 (1892)," &c.

The † and ‡ employed throughout indicate respectively that Mr. Dykes has grown and flowered the plant and raised it from seed; the dissociation of the name from its authority is odd, but far stranger is the placing of the name of the section where the authority usually stands; e.g., *I. persica* Juno." The page-headings contain only the names of sections where the name of the species beneath should appear; those names which "probably represent plants that have no real claim to specific rank," but are "retained here since they are of some use in the garden to denote certain classes of hybrids," are in no way differentiated in type or by special heading from the species retained; had these latter been numbered, as is usually the case in monographs, some indication of their different position would have been apparent, but unfortunately this is not the case. On the other hand, the names of species which have been fully described as such, but of which Mr. Dykes has been unable to obtain specimens, are sometimes printed in lower case italics (see p. 209).

The printing of the index, however, is quite satisfactory; the species retained are in black type, which is also employed for the principal references. But here again the ineptitude of the arrangement is manifest; no reference to the plates is given—for this one has to turn back to a list (facing the introduction), of which no indication is given in the contents of the book. Moreover, although the principle of having only one index is rigidly adhered to, the index is far from complete—*e.g.*, the synonyms, other than those under *Iris*, are omitted (*Xiphion* for example finds no place).

We regret to find so much ground for criticism in so handsome and so important a volume, but we have by no means exhausted the notes which we jotted down when going through the work. These of course relate to points which concern the botanist only, and the horticulturist, to whom the book chiefly appeals, will not be affected by such matters of detail. The lovers of beautiful pictures also will not be deterred from acquiring the volume, for the appeal to them is in no way lessened by what has been said as to the letterpress. But the University of Cambridge has thrown away an opportunity of producing a work which might easily have been as beautiful in its typography as it is in its illustrations.

Studies in Seeds and Fruits: an Investigation with the Balance. By H. B. Guppy, M.B., F.R.S.E. Williams & Norgate. Price 15*s*. net.

Dr. Guppy is to be envied in that he can devote all his time to original research, and can apparently pursue such research in any part of the world to which its needs may direct him. His previous work led us to expect at his hands painstaking observation and experiment, and cautious unprejudiced deductions. Such work is bound to yield some results of interest and value. In the present volume we have these same qualities; and yet we feel dissatisfied with the result. In the first place, Dr. Guppy restricts his methods to the simplest—to little beyond an oven and a balance—when we should often be glad of the additional information that chemical testing or analysis could afford. Secondly, he glories in the discursive character of his work, a feature which renders it very difficult to estimate with any regard to brevity or coherency. Lastly, it is borne in upon us that the book is too big, that its five hundred pages contain masses of notebook details which we could well spare, though these serve, of course, to demonstrate the author's conscientiousness. We hasten, too, to acknowledge that he lays us under an obligation by providing excellent summaries of his chapters.

After this grumble, however, one is fain to admit that his results, though mostly physiological, constantly prove very suggestive in many other directions. An impermeable seed-covering proves effective in securing delayed germination or greater longevity for the resting seed. Hygroscopicity is shown to be a physical, rather than a vital, property; and it is certainly a warning against much of the exaggerated post-Darwinian teleology that Dr. Guppy is able to show most convincingly that wings and parachutes to seeds and fruits, though they may serve accidentally in aiding short-distance, or even long-distance, dispersal, do not always do so, and were not originally developed for this end. In this view he is professedly following Goebel; but Bentham had brought forward the same argument years before in reference to the *Compositæ*.

The insistence on the comparison of a ripe dry fruit with a shrivelled, and not with the merely ripe and still juicy, succulent fruit, may prove of some importance; while the distinction between capsules and legumes—that the former dehisce and dry, while the latter dry and dehisce—is certainly so; but we own to having hoped for more from chapters headed "The Homologies of Fruits." Has it ever, for example, been demonstrated by an adequate developmental study that Brazil-nuts are true seeds and not endocarps? Such systematic descriptions of the ripe fruits as occur in Miers's papers on the Lecythidaceæ are, of course, by no means conclusive. We merely throw out a query for Dr. Guppy, or some other worker in the tropics.

Most attractive descriptions of the variety of colour in the seeds of plants seen in Jamaica and in Devonshire convey little suggestion as to any explanation of this variety, neither does Dr. Guppy mention one striking instance among plants familiar to British botanists, the turquoise seeds of *Impatiens biflora* Walt., nor, curiously enough, the lilac testa of the ivy, though he gives an admirable illustrated account of the development of the ruminate perisperm and embryo in the latter. We remember a gathering of botanists some years ago being a good deal puzzled by a quantity of these seeds dropped down a chimney by starlings.

As to the interesting point of the very varied rest-period of seeds and the generalization, which Dr. Guppy quotes from the late Mr. Hart, of Trinidad, that most tropical seeds have a very fugitive vitality, it seems obviously probable that longevity, an acquired character most desirable in more temperate climates, is not so much needed where seed-production, like the other stages of plant-life, is hardly restricted to any one part of the year, and that it has, therefore, not in these cases been acquired.

One hardly expects side-lights on systematic botany from such researches as these; but the conclusions (p. 487) that green cotyledons occur generally among the *Discifloræ* of Bentham and Hooker, and (p. 482) that *Bidens tripartita* L. is a dry-condition form of *B. cernua* L. will interest others than physiologists.

Dr. Guppy is, perhaps, a little ahead of our modern tacticians when he suggests (p. 17) that an army is to be led by its airmen, though many previous thinkers have proclaimed that the dreamers are the leaders of the world. After the interesting array of carefully ascertained facts which he has provided for us, it would, we suppose, be churlish to grudge him his flights of fancy in his final chapter, even if we fail to find any great gain in considering the seed as adapted to lunar or other "cosmic" conditions, while the full-grown plant is "more conditioned," so as to be merely "terrestrial."

G. S. Boulger.

BOOK-NOTES, NEWS, &c.

Under the heading "The Society for the Promotion of Nature Reserves," we have received the following circular: "In view of the dangers which at the present time threaten our indigenous fauna and flora with extinction, it has been thought advisable to found the above Society, the principal objects of which are the following:—i. To collect and collate information as to areas of land in the United Kingdom which retain their primitive conditions and contain rare and local species liable to extinction owing to building, draining, and disafforestation, or in consequence of the cupidity of collectors. All such information to be treated as strictly confidential. ii. To prepare a scheme showing which areas should be secured. iii. To obtain these areas and hand them over to the National Trust under such conditions as may be necessary. iv. To preserve for posterity as a national possession some part at least of our native land, its fauna, flora, and geological features. v. To encourage the love of nature and to educate public opinion to a better knowledge of the value of nature study. While it is fully recognized that something has already been done in this direction by certain societies and by individual enterprise, it is certain that a great deal may yet be accomplished to prevent further destruction, if prompt action is taken. It is proposed to effect these objects by means of the Press, by personal efforts, by correspondence with local societies and individuals, and by such other means as may suggest themselves from time to time." The President of the Society is the Right Hon. J. W. Lowther; Dr. Bayley Balfour, Sir Francis Darwin, Mr. Druce, and Sir David Prain are members of the Council. Communications should be addressed to the Secretary of the Society, at the Natural History Museum, Cromwell Road, S.W. A remarkable feature of the Society is that "there shall be no subscription"; "members shall be elected by invitation of the executive committee."

In *Annals of Botany* for January, Miss Winifred Brenchley continues her investigations on the weeds of arable land, of which she publishes a third part. In this she deals with West Norfolk, where the total number of species and genera was far in advance of those for Bedfordshire and the West Country, though the number seen once or twice only was practically the same in each of the three districts. At the end "an alphabetical list of the more important weeds" is given, giving the common, and where possible, the local names; we presume the latter have been restricted to those collected by Miss Brenchley herself in the district, for a reference to the *Dialect Dictionary* or the *Dictionary of English Plant-Names* would show many additions for West Norfolk. *Veronica Tournefortii* is called "Buxbaum's Speedwell"—which can never have been in common use and was applied to the plant in books when it was called *V. Buxbaumii*—and "Cuckoo's Leaves," a pretty name referring perhaps to its early appearance. "Makebeg," *Spergula*, has many analogies; "Ram's glass" for

Ranunculus acris must be a variant of the Dorset "Ram's Clas" (or claws) applied more appropriately to *R. repens*; "Floatweed" for *Tussilago* must we think be a misrendering of Clote-weed—the plant is called Clot or Clote in East Norfolk; "Wee Gweedie" for *Euphorbia Peplus* is analogous to the Scotch "Little Good"—in Aberdeenshire "Little Gweedie"—for *E. Helioscopia*, and was probably introduced by a Scottish farmer.

At the meeting of the Linnean Society on February 6th, 1913, Miss Bancroft read a paper, of which the following is an abstract:—The structure of *Rhexoxylon africanum*, a fossil stem described by Dr. A. W. Rogers as probably coming from the Karroo rocks of Cape Colony, indicates affinities with the Medulloseæ of later Palæozoic age. The vascular system consists of an inner ring of elliptical steles, each composed of a large inversely orientated part from which traces may separate, and a small normal part. The "partial pith" of each stele is much reduced. Externally is a series of "partial steles," having normally orientated elements only. The lateral margins of the partial steles are often much broken by the separation of traces. The protoxylem elements are situated at the inner margins of the xylem-masses; the metaxylem elements typically possess biseriate bordered pits. The medullary rays are uniseriate throughout. Scattered irregularly throughout the parenchymatous ground tissue are vascular strands, bands of periderm and sclerotic nests. The outer layers of the stem are absent. The name *Rhexoxylon* is suggested as being descriptive of the broken-up nature of the xylem. The new genus is included in the Medulloseæ, although it differs from the typical members of the family in the "coniferous" texture of the wood with its uniseriate medullary rays and Araucarian type of pitting.

The foolish and mischievous outrages by which certain women are damaging what we believe to be an excellent cause have included an attack upon the orchid-houses at Kew. It may not be generally known that the intention of the attack was philanthropic; this we learn from a speech by Mrs. Pankhurst, the "militant" leader, as reported in the *Morning Post* of Feb. 11. "There were people," she said, "who said it was wrong to destroy in a single night choice flowers which had taken years to reach that pitch of perfection, but how many lives were sacrificed in collecting the plants from the swamps where they grew, and what a useless sacrifice that was as compared with the great benefits which they hoped would come out of the destruction of these orchids at Kew? Was it not necessary for women to do these things in order to call attention to the horrors that people had to suffer in the production of these beautiful flowers?" Are we to infer from this that the *mulier fortis* and her followers had made themselves acquainted with the history of the species damaged, and confined themselves to attacks upon swamp-loving species?

THE BRITISH SPECIES OF ARCTIUM.

By A. H. Evans, M.A.

Of late years there has been a widespread idea in Britain that the genus *Arctium* presented great difficulties to its students, both as regard nomenclature and the identification of our native species. The synonymy certainly involves some difficult questions, but I hope here to show that the identification is comparatively simple. A great part of the confusion is probably due to excessive reliance on herbarium specimens, the use of which, though most important in their proper place, should in the case of *Arctium* follow, and not precede, the examination of freshly gathered material. Most of the forms lose something of their characteristic appearance when pressed, and, if the examples to hand are not mature and carefully selected, they may easily lead to erroneous conclusions. The difficulties are of course greatest to those persons residing in districts where only one or two of the forms are found, when they attempt to follow the arrangement in a single text-book. In Cambridgeshire, however, we are particularly fortunate, as all the members of the genus recorded for Britain are comparatively abundant, and in at least one locality may all be found growing within a few hundred yards of one another.

I have been interested in this small group of plants for many years, and for the last two or three have made a careful study of it, receiving much assistance at the British Museum, from the Editor of this Journal, and others, as well as from various friends and correspondents. Last year I spent most of the summer vacation in revisiting various counties in search of species of *Arctium*, going by way of Surrey, Hants, and Devon to Cornwall, and thence northwards to Northumberland and the Eastern Border counties, with a short sojourn in Stirlingshire. I also procured specimens from many places which I was unable to reach in the time at my disposal, while I had previously visited Orkney and Shetland.

No one who has examined a large number of these plants in the field is likely to assign his specimens to more than four species, and this is in accordance with Professor Babington's conclusions in 1856 (Ann. Mag. N. H. xvii. 369), if we allow for the fact that, of the five there given, he afterwards admitted that *A. tomentosum* was unknown in Britain. But I submit that there are only three species as yet known in the country, and that the fourth form is a subvariety, which I have renamed to prevent confusion, as will be seen in the synonymy given below. This is "*A. nemorosum* auct. angl.," which Babington, in the fourth edition of his *Manual of British Botany*, and in the article cited above, identified with *A. intermedium* Lange. He then called the real *A. intermedium* *A. pubens*, though he subsequently withdrew this name and changed it on every sheet in his herbarium.

Our largest species, *A. Lappa*, can hardly be confounded with any other by those who have once seen it in flower and mature fruit. It is a plant of the outskirts of woods, copses, and shady places, distinguished from all its British congeners by its solid petioles, and has large almost hemispherical heads, which become more and more flattened above as they ripen, while the phyllaries are unusually spreading. It is locally known as the Great Burdock.

The remaining British forms have not unfrequently been classed under the general heading of *A. minus*, whether as subspecies or varieties, but this procedure is only possible to those who have not studied growing plants. *A. minus* is a very distinct species, practically confined to woodlands or even woods proper, and is on the whole the tallest of the British forms, though less stout than *A. Lappa*, and with somewhat smaller leaves, which are more nearly serrate than crenate. The small heads also are oval, and are racemose instead of subcorymbose in properly grown specimens, while they are as nearly as possible closed by the appressed phyllaries in fruit.

A third species is *A. vulgare* (= *A. intermedium* of Lange), which is undoubtedly the most common British species. During the whole of my above-mentioned trip I found little else, from Cornwall to mid-Scotland, whether I was investigating wood margins, shady lanes, dusty hedges or roadsides, sea-cliffs or sandy dunes. It is a much shorter plant than either of the foregoing, and has not the small closed heads of *A. minus* when in fruit, though the petioles are hollow, as in that species. In fruit it is, as Lange's name implies, intermediate between *A. Lappa* and *A. minus*, but can never be mistaken for either. The large subcorymbose heads separate this plant readily from the latter, and the hollow petioles from the former. The heads, moreover, are open in fruit, as in *A. Lappa*, but never to so great an extent, since the phyllaries spread much less.

"*A. nemorosum*" of British authors is merely a subvariety of *A. vulgare*, with comparatively sessile heads at the ends of the branchlets, and apparently no other constant feature. Intermediate specimens are constantly to be found with every variation in the length of the peduncle, while the heads are never really sessile, though often conglomerated at the ends of the branches.* This form is that which is usual north of the Border, and reaches North Cornwall, though uncommon there. It also reaches the Orkneys and the Shetlands, while I have not yet found typical *A. vulgare* north of Haddingtonshire and the Isle of May. Records of *A. minus* from Northern Scotland probably refer in most cases to this subvariety.

Throughout my investigations in the field I have only met with one plant which appeared to be a hybrid, and that was a doubtful case, as it was in bad condition. Where three or four of the species grow close together hybrids might be expected, but I have seen none such. On the other hand, there is no limit to the hybrids that might be propounded from dried herbarium material, especially from immature specimens of *A. Lappa* or poor examples of *A. vulgare*, while the heads of *A. minus*, when pressed, often look so large that students may well be excused if they fancy that they recognize hybrids with one of the two other species. I hope to recur to this subject, however, at a later time, as I have plants in various localities under observation, though I believe that all will prove to be robust specimens of *A. minus* or small shade-grown forms of *A. Lappa*. As regards Britain, undoubted hybrids have yet, it appears, to be found, and the theory sometimes mooted that *A. vulgare*—that is, *A. intermedium* of Lange—consists of a series of varying hybrids is quite untenable. On the other hand, we have in this country several *formæ*: for instance, *A. minus*, as well as *A. vulgare*, may be green or purplish in general coloration, and all three species may have more or less arachnoid heads. In some years the arachnoid condition is much less evident than in others, or it may be entirely absent; this is usually the case in a dry season, though it cannot yet be asserted with certainty that drought is the sole cause of the disappearance of the "wool." So also green and purplish forms may grow in the closest proximity, though not in the same patch. It is noticeable that the green form of *A. minus* constantly has light pink flowers, like those of *A. Lappa*, whereas the purplish form has the darker flowers of *A. vulgare*. Exceptionally arachnoid specimens of the green form of *A. vulgare* probably misled Babington into giving them the appellation of *A. pubens*, as far as we can judge from his herbarium and his description.

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* The same conglomerated heads may often be seen in *A. minus*.

By the International Rules we must take as our starting point Linnæus's *Species Plantarum*, ed. i. (1753), where the genus stands as *Arctium*. *Lappa* as a generic name must therefore be discarded.

In conclusion, I give a somewhat extended synonymy of the British members of the genus, adding that of *A. tomentosum* in brackets, for it is possible that it may yet be discovered within our islands, perhaps on the dry sands in Norfolk or Suffolk. Herein I have had the inestimable advantage of the aid of Dr. Moss, Curator of the Herbarium at Cambridge. As early as 1761 Hill (*Vegetable System*, iv. 28) gave very fair descriptions and unmistakable figures of three British species, so that the confusion that has subsequently arisen as to their proper names is very largely due to students ignoring his work.

The Great Burdock must stand as *A. Lappa* L. Sp. Plant. 816, excl. var. β.*

The Small Burdock must stand as *A. minus* Bernhardi Syst. Verz. Erf. i. 154. It is the *Lappa minor* of Hill.

The medium-sized Burdock must stand as *Arctium vulgare* mihi. The name is really due to Hill, and it is with the greatest reluctance that I follow the received practice among botanists of attributing it to myself, though there appears to be no way of avoiding such action. Miller (Gard. Dict. ed. 8) was very nearly first in the field with his name of *A. personata*; for his reference to Vaillant, and that writer's further reference to a figure of Lobel's, show that the present species was intended, as indeed is pretty clear from Miller's remarks on its distribution. Typical specimens of "*A. intermedium*" sent by Lange to Babington correspond exactly to the British plant; on the other hand, the description and photograph of Lejeune's "*A. nemorosum*" seem to be conclusive as to its being *A. minus*. *A. macrosperma* Wallroth has by some authors been used for *A. vulgare*, but the description in *Linnæa*, xiv. 63 A is surely that of *A. Lappa*, though by some confusion "*Lappa major*" is mentioned also.

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* It is perhaps worth noting here that the only specimen in the Linnean Herbarium is very poor, and consists of a short branchlet with very small leaves and tomentose heads. Linnæus labelled it *I. Lappa*, but it may be *A. vulgare*. In Smith's Herbarium we find only two examples, referable to *A. minus* (certainly) and "*A. nemorosum*" (probably).

The so-called species "*A. nemorosum*" of British authors generally—not necessarily of Continental—I sink to a subvariety, as stated above, and for it I propose the name of *pycnocephalum*. The mere fact of conglomerated heads, nearly but not truly sessile, is not sufficient to characterize a valid species or even variety.

The distribution of the different plants needs further investigation, and I hope to be able to do more work in that direction: meanwhile, I should be most grateful for fruiting specimens from the various counties, which may be fresh or dried, so long as they are not pressed or in any way flattened.

1. ARCTIUM LAPPA L. Sp. Pl. 816 (1753), excl. var. β; L. Flor. Angl. 22 (1754); Miller, Gard. Dict. ed. 8, No. 1 (1768); Willdenow, Sp. Pl. iii. 1631 (1800); Babington in Ann. & Mag. Nat. Hist. iv. 254 (1840); *id.* Man. Br. Bot. 171 (1843); Schinz und Keller, Fl. Schweiz. 569 (1909).

Lappa Arctium Hill, Veg. Syst. iv. 28, fig. 2 *a*, *b* (1761).

L. glabra Lamarck, Fl. France, ii. 37 (1778), excl. var. β.

L. officinalis Allioni, Fl. Ped. i. 145 (1785), *partim*; Ascherson und Graebner, Fl. Nord. Flachl. 743 (1899).

L. major Gaertner, De Fruct. ii. 379, t. 162, fig. 3 (1789).

A. majus Bernhardi, Syst. Verz. Erf. i. 154 (1800); Schkuhr, Bot. Handb. iii. 49 (1808); Fries, Fl. Suec. 264 (1828); Wimmer et Grabowski, Fl. Siles. iii. 105 (1829); Babington, Man. Br. Bot. ed. 2, 182 (1847), including *A. tomentosum*, id. in Ann. & Mag. Nat. Hist. ser 2, xvii. 373 (1856), including *A. tomentosum*, op. cit. ser. 3, xv. 9 (1865); Rouy, Fl. France, ix. 94 (1905).

L. macrosperma Wallroth in *Linnæa*, xiv. 639 (1840), *non* v. Dalla Torre und v. Särntheim.

L. vulgaris Williams, Prodr. i. 53 (1901), *non* Hill.

Icones.—Hill, *ut supra*; Reichenbach, Icon. xv. 54, t. 812, figs. 3–11, as *L. officinalis*; Fl. Dan. t. 2423, as *L. tomentosa*, t. 2424, as *L. major*: Syme, Eng. Bot. v. t. 699, as *A. majus*.

A. LAPPA forma SUBTOMENTOSUM mihi.

A. majus subvar. *subtomentosum* Legr. in Bull. Assoc. Fr. Bot. ii. 69; Rouy, Fl. France, ix. 95 (1905).

[ARCTIUM TOMENTOSUM Miller, Gard. Dict. ed. 8, No. 3 (1768); Bernhardi, Syst. Verz. Erf. i. 157 (1800); Schkuhr, Bot. Handb. iii. 49, t. 227 (1803); Persoon, Syn. ii. 383 (1807); Rouy, Fl. France, ix. 96 (1905), *non* Babington.

Arctium Lappa var. *β*, L. Sp. Fl. 816 (1753).

Lappa tomentosa Lamarck, Fl. France, 263 (1778); Allioni, Fl. Ped. i. 144 (1785); Ascherson und Graebner, Fl. Nord. Flachl. 744 (1899).

A. Bardana Willdenow, Sp. Pl. iii. 1632 (1800), *non* Smith.

A. Lappa Fries, Fl. Suec. 263 (1828), *partim.*

Icones.—Sven. Bot. t. 63, as *A. Lappa*; Fl. Dan. t. 642, as *A. Lappa*; Reichenbach, Icon. xv. t. 811, fig. 2, as *L. tomentosa.*]

2. ARCTIUM VULGARE mihi.

Lappa vulgaris Hill, Veg. Syst. iv. 28, fig. 1*a*, *b* (1761).

A. Personata Miller, Gard. Dict. ed. 8, no. 2 (1768), *non* L.

L. officinalis Allioni, Fl. Ped. 145 (1785), *partim*, non Ascherson und Graebner.

A. Lappa Schkuhr, Bot. Handb. iii. 48 (1803).

L. intermedia Lange, Fl. Dan. t. 2663, fasc. 45, 8 (1844).

A. intermedium Lange, Dansk. Fl. 463 (1851); Babington in Ann. & Mag. Nat. Hist. ser. 3, xv. 9 (1865).

A. pubens Babington, *op. cit.* ser. 2, xvii. 376 (1856); Man. Br. Bot. ed. iv. 185 (1856).

A. majus subsp. *nemorosum* Rouy, Fl. France, ix. 95 (1905), ? including *A. pubens*.

L. nemorosa Koernicke in Schrift. Phys. Ökon. Ges. Königsberg, 63 (1864); Ascherson und Graebner, Fl. Nord. Flachl. 743 (1899).

A. macrospermum Ascherson, Fl. Brand. 353 (1864); v. Dalla Torre und v. Särntheim, Blütenpfl. Tirol, vi. pt. iii. 595 (1912), *non* Wallroth.

A. minus subsp. *intermedium* Syme, Eng. Bot. xxv. t. 700 (1866).

Icones.—Hill, *ut supra*; Reichenbach, Icon. xv. t. 812, figs. 1–2, as *L. intermedia*; Fl. Dan. t. 2663, as *L. intermedia*; Syme, *ut supra.*

A. VULGARE subvar. PYCNOCEPHALUM mihi.

A. intermedium Babington in Ann. & Mag. Nat. Hist. ser. 2, xvii. 374 (1856); Man. Br. Bot. ed. 4, 184 (1856).

A. nemorosum Babington in Ann. & Mag. Nat. Hist. ser. 3, xv. 10 (1865); Man. Br. Bot. ed. 7, 197 (1874), *non* Lejeune.

A. minus subsp. *nemorosum* Syme, Eng. Bot. v. 25, t. 701 (1866), excl. syn.

A. Newbouldii A. Bennett in Journ. Bot. xxxvii. 342 (1899); in Irish Nat. xii. 289, 290 (1203).

A. VULGARE forma SUBTOMENTOSUM mihi.

= *? A. pubens* (*partim*) Babington in Ann. & Mag. Nat. Hist. ser. 2, xvii. 376 (1856).

A. intermedium var. *subtomentosum* A. Bennett in Bot. Exch. Club Brit. Isles Rep. for 1891, 328 (1892).

A green plant, with densely tomentose heads.

A. VULGARE forma PURPURASCENS mihi.

Lappa minor f. *purpurascens* A. Blytt, Norges Fl. ed. i. 610 (1861).

3. ARCTIUM MINUS Bernhardi, Syst. Verz. Erf. i. 154 (1800); Schkuhr, Bot. Handb. iii. 49 (1803); Babington in Ann. & Mag. Nat. Hist. ser. 2, xvii. 375 (1856); Rouy, Fl. France, ix. 95 (1905).

Lappa minor Hill, Syst. Veg. iv. 28, fig. 3*a* (1761): DC. Fl. France, iv. 77 (1805).

L. glabra var. β Lamarck, Fl. France, ii. 37 (1778).

A. major var. *minus* Gray, Nat. Arr. ii. 435 (1821).

A. Lappa Fries, Fl. Suec. 263 (1828), *partim.*

L. glabra var. *minor* Duby, Bot. Gall. i. 282 (1828).

A. nemorosum Lejeune, Comp. Fl. Belg. iii. 129 (1836), *non* Babington.

A. minus subsp. *euminus* Syme, Eng. Bot. v. 26, t. 702 (1866).

L. glabra Ascherson und Graebner, Flor. Nord. Flachl. 743 (1899).

Icones.—Hill, *ut supra*; Curtis, Fl. Lond. ii. 173, as *A. Lappa*; Smith, Eng. Bot. t. 1228, as *A. Lappa*; Reichenbach, Icon. xv. t. 811, figs. 1–3, as *L. minor*; Woodville, Med. Bot. t. 15, as *A. Lappa*; Fl. Dan. t. 2662, as *L. minor*; Syme, *ut supra.*

A. MINUS forma PANICULATUM mihi.

L. minor var. *paniculata* Lange, Dansk. Flor. ed. 4, 357 (1886).

A. MINUS forma PURPUREA mihi.

L. minor forma ? *purpurea* Blytt, Norg. Fl. 710 (1906).

Several hybrids have been reported at different times from abroad; these are here given in case they are hereafter found in Britain; in fact, Beeby (Journ. Bot. xlvi. 380 (1908)) records the first from several counties, without specifying them:—

1. A. LAPPA × MINUS comb. nov.

A. subracemosum Nyman, Consp. Fl. Europ. Suppl. ii. 179 (1889), *nomen.*

Lappa notha Ruhmer in Königl. Bot. Gart. i. 238 (1881).

L. glabra × *officinalis* Ruhmer, *loc. cit.*; Aschers. & Graebn. Fl. Nord. Flachl. 744 (1899).

× *A. subracemosum* Rouy, Fl. France, ix. 98 (1905).

[2. A. LAPPA × TOMENTOSUM Beck, Fl. Nied. Oesterr. 1228 (1893).

Lappa major × *tomentosa* Haussprecht in Oesterr. Bot. Zeit. xiv. 206 (1864).

A. ambiguum Nyman, Consp. Fl. Europ. Suppl. ii. 179 (1879–80).

Lappa ambigua Celakowksi, Prod. Flor. Böh. 249 (1871).

L. officinalis × *tomentosa* Aschers. & Graebn. Flor. Nord. Flachl. 744 (1899).

× *A. ambiguum* Rouy, Fl. France, ix. 97 (1905).]

3. A. LAPPA × VULGARE, comb. nov.

L. officinalis × *nemorosa* (*L. cimbrica*) Aschers. & Graebn. Fl. Nord. Flachl. 743 (1899).

[4. A. MINUS × TOMENTOSUM, comb. nov.
L. Ritschliana Ascherson, Ber. Deut. Bot. Ges. ix. 99 (1891).
L. glabra × *tomentosa* Aschers. & Graebn. Fl. Nord. Flachl. 744 (1899).]

5. A. MINUS × VULGARE, comb. nov.
L. maasii M. Schultze, B. V. Thür. ii. 214 (1884).
L. nemorosa × *glabra* Aschers. & Graebn. Fl. Nord. Flachl. 743 (1899).

TWO NEW SCOTTISH HAWKWEEDS.

BY THE REV. E. S. MARSHALL, M.A., F.L.S.

Hieracium Isabellæ, n. sp.—*Planta* 2–5 decim. alta. *Caulis* subflexuosus, pilis sparsis longioribus gracillimis albidis præditus; superne flocculosus ac sæpe glandulosus. *Folia* tenuiora, flaccida, in apricis brunneo-purpurascentia, ciliata, in margine hinc inde micro-glandulifera, utrinque plus minus albido-pilosa; radicalia 3–4, in petiolum subalatum laminam (exceptis primariis) sæpe æquantem cuneato-attenuata, ambitu lanceolata, vel in exemplis robustis ovali-lanceolata, apicem versus integerrima, acuta aut mucronata, utrinque dentibus subtriangularibus (in primariis grossis) 3, rarius 4–6, mucronatis instructa; caulinum solitarium, in speciminibus parvis aliquando 0, vel bracteæ simile, lanceolatum lineari-lanceolatumve; petiolum late alatum; lamina ad apicem integram acutissimam atque ad basin sensim attenuata. *Bracteæ* anguste lineares, acutæ. *Pedunculi* recti, rarius curvuli, dense flocculosi glandulosique. *Capitula* 1–3, rarius 4–5, mediocria vel majuscula, basi cuneata, serius paullulum rotundata. *Phyllaria* linearia, pilis albidis crispulis eglandulosis, glanduliferisque rectis inæqualibus (nonnunquam perpaucis), flocculoque, præcipue basin versus, induta; exteriora obtusiuscula, subsenescentia; interiora glabrescentia, acuta, margine vel tota hyalina. *Ligulæ* aureæ, phyllariis interioribus subduplo longiores, apice glaberrimæ. *Styli* e livido nigrescentes. *Achenia* nigro-castanea. *Pappus* sordide albus.

Plant 2 to 5 decimetres high. *Stem* usually flexuose, with scattered, rather long, very slender, whitish hairs; flocculose and often glandular, above. *Leaves* thinnish, flaccid, purplish-brown in exposure, ciliate, with occasional small glands on the margin, more or less whitish-pilose on both sides; radical 3 to 4, narrowed like a wedge into the somewhat winged petiole, which often (except in the primary ones) equals the blade, lanceolate, or in strong examples oval-lanceolate in outline, quite entire towards the point, acute or mucronate, with 3, more rarely 4 to 6 pairs of subtriangular, mucronate teeth (coarse, in the primary ones); cauline solitary, sometimes absent or bractlike, in small specimens, lanceolate or linear-lanceolate; petiole broadly winged; blade narrowed to the entire, very acute point and the base. *Bracts* narrow-linear, acute. *Peduncles* straight (rarely a little curved), densely flocculose and glandular. *Heads* 1 to 3, more seldom 4 to 5, medium-sized or rather large, wedge-shaped at the base, afterwards slightly rounded. *Phyllaries* linear, clothed with whitish, rather curly, eglandular, and straight, unequal, glandular hairs (sometimes very few), and, principally towards the base, with fine floccose down; outer bluntish, rather senescent, inner glabrescent, acute, hyaline at their borders, or wholly so. *Ligules* golden yellow, about twice as long as the inner phyllaries, quite glabrous at the tips. *Styles* livid or blackish. *Achenes* dark chestnut. *Pappus* dirty white.

Exsiccata.—E. S. Marshall, Nos. 3589, and 3610 to 3617, inclusive.

I name this striking plant after my wife Fanny Isabel (*née* Foster), in commemoration of our recent "silver wedding" and in gratitude for her constant, sympathetic companionship on so many botanical excursions, over and above the fact that some of the gatherings on which this species is founded were made by her while I was amusing myself by fly-fishing on Loch Ericht, with indifferent success.

H. Isabellæ is frequent by rocky alpine and subalpine streams in the neighbourhood of Dalwhinnie, E. Inverness (*Shoolbred & Marshall*, July, 1911), extending over the county "march" into Perthshire, at 1800 to 2500 feet. Doubtless it will be found elsewhere. The stations at present known to me are as follows:—

V.-c. 88, Mid Perth.—Allt Coire Luidhearnaidh, west of Dalnaspidal, and north of Loch Garry.

V.-c. 96, East Inverness.—Allt a' Choire Bhathaich; Allt Beal an Sporain; streamlets on the west side of Ben Alder, below Coire Chomlain; and Allt an Lochain Dhuibh, about five miles north of Cluny Castle. All these are somewhat shaded localities, with the exception of the Perthshire one, where alone the bronze-leaved state was obtained. It seems to be equally at home on gneiss and granite.

I believe that this species should be referred to the subsection *Alpina Nigrescentia*; the root-leaves show considerable resemblance to such members of the group as *H. nigrescens* Willd., and *H. submurorum* Lindeb., though they have a peculiar *facies* of their own: and the presence of a few small marginal stalked glands favours such a conclusion. Like *H. hyparticum* Almq. (otherwise totally different), it has cuneate-based heads; but there are never so few black-stalked glands on any other British member of the subsection. Its nearest ally appears to be *H. callistophyllum* F. J. Hanb., the var. *cremnanthes* of which (first published under *H. Marshalli* F. J. Hanb.) has winged petioles. Their head-clothing is much alike, though the simple hairs are more plentiful in *H. callistophyllum*, which also I incline to refer to *Alpina Nigrescentia*, and consider to be closely related to *H. Marshalli*. Lindeberg at first called *H. callistophyllum* "*H. nigrescens*,* forma; at squamæ obtusiores et magis floccosæ."

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* i. e. *H. curvatum* Elfstrand ('*nigrescens*' Fries, Lindeberg, Backhouse, non Willdenow).

That is, of course, thoroughly distinct from *H. curvatum*, but hardly belongs to the *Vulgata* section. The Rev. E. F. Linton's comment on my No. 3617, in the *Watson Botanical Exchange Club Report*, 1911–12, p. 343, rather supports the view now taken:—"There is a look of *Nigrescentia* about the foliage of these plants, but not in the heads, which are like some of the *Silvatica*. It may be one of the connecting links between these two groups. I have no name for it."

H. Isabellæ is sure to occur in Atholl Forest, v.-c. 89 East Perth; one of its known stations is close to the county border.

Hieracium Shoolbredii, n. sp.—*Planta* 1·5–4 decim. alta. *Caulis* sulcatus, curvulus, prope basin crinibus albis gracilibus longioribus pubescens aut villosus, ad medium glabrescens, superne parum flocculosus, admixtis hinc inde setis glanduligeris, supra medium fere ramosus. *Folia* læte gramineo-viridia, in apricis purpurascentia, firma, sed vix carnosa, superne glabra, inferne (ad costam præcipue medianam) pubescentia, longius albo-ciliata; radicalia primaria orbicularia vel late ovata, sæpius integerrima, obtusa vel mucronata; reliqua ambitu valde varia, ovata vel oblongo-ovata, in plantis proceris exciso repandove dentata (dentibus plerumque patentibus, prope basin subtruncatam longioribus), apicem versus subintegra, in exemplis minoribus nonnunquam minute sinuata, parce dentata, breviter acutæ vel subobtusæ; caulinum unicum, sessile vel breviter petiolatum, lanceolatum, in apicem gracilem protractum, interdum 0 vel bracteiforme. *Bracteæ* parvæ, subulatæ. *Pedunculi* subrecti, longi longissimive, cano-floccosi, plus minus glandulosi (rami secundarii acladium evidenter superant). *Capitula* 1–6, pro hac subsectione majuscula, campanulata. *Phyllaria* exteriora curta, obtusa, linearia vel oblonga; interiora ante anthesin eximie porrecta, anguste linearia, prælonga, acutissima; cuncta distincte senescentia, cano-floccosa, setis glanduliferis brevibus, mediocribus, necnon longis numerosis, pilisque longis albis simplicibus vestita. *Ligulæ* citrino-luteæ, neque aureæ, phyllaria interiora subduplo superantes, apice pilosissimæ. *Styli* nigrescentes. *Achenia* maturitate nigra. *Pappus* albus, nitescens.

Plant 1·5 to 4 decimetres high. *Stem* furrowed, somewhat curved, pubescent or villous near the base with rather long, slender, white hairs, glabrescent in the middle, slightly flocculose upwards, with occasional glandular bristles, generally branched above the middle. *Leaves* bright grass-green, purplish in exposure, firm, but scarcely fleshy, glabrous above, pubescent beneath (chiefly on the midrib), fringed with rather long hairs; primary radical ones orbicular or broadly ovate, mostly quite entire, blunt or mucronate; the rest varying much in outline, ovate to oblong-ovate, scalloped or repand-dentate in strong plants (teeth usually patent, longer at the subtruncate base), subentire towards the tip, in small plants sometimes minutely wavy, sparingly dentate, shortly pointed or bluntish; stem-leaf one, sessile or shortly stalked, lanceolate, tapering into a slender point, sometimes absent or bract-like. *Bracts* small, subulate. *Peduncles* nearly straight, long or very long, cano-floccose (the secondary branches clearly exceed the acladium). *Heads* 1 to 6, rather large for this subsection, campanulate. Outer *phyllaries* short, blunt, linear or oblong; inner remarkably porrect in bud, narrow-linear, very long and acute; all decidedly senescent, cano-floccose, clothed with short, medium-sized, and long gland-tipped bristles, and with many long, white, simple hairs. *Ligules* lemon-yellow, not golden, about twice as long as the inner phyllaries, very pilose at the tips. *Styles* blackish. Ripe *achenes* black. *Pappus* white, rather shining.

Exsiccata.—E. S. Marshall, Nos. 3284–5; also 3602–9, inclusive.

I dedicate this species to my old friend W. A. Shoolbred, in whose company the whole series was collected. It is very striking when alive; but some of the characters are obscured in the process of drying. Both W. A. S. and Rev. E. F. Linton have suggested *H. sanguineum* Ley for it; but Rev. Augustine Ley remarked, on the original gatherings:—"Not *sanguineum*, but *silvaticum* var. *tricolor* "—an identification which cannot be upheld. Later, Mr. Linton thought that it might be "a local species"; his present view is that "this species will have to be placed near *H. sanguineum* Ley," and I fully concur. Superficially, the resemblance between herbarium examples of both is very striking; but a closer comparison renders their union impossible. In *H. Shoolbredii* the leaves are extraordinarily vivid green, not dull, with longer ciliation; the heads are still larger, but not so broad in proportion, and the very porrect phyllaries (in bud) are a good distinctive mark. The stalked head-glands are far more numerous, stouter, and more unequal; while the simple hairs are long, white (not dusky), and considerably more abundant. Instead of being slightly ciliate, the ligules are extremely so; and the styles are a good deal darker. Several minor divergences might be added; but this is hardly needed.

We first found this hawkweed in 1908, near Inchnadamph, in three stations, and used to speak of it as "false *hyparcticum*," from a superficial resemblance in their habit (the lower branch of a specimen in my herbarium, including the peduncles and heads, rather exceeds 1·5 decimetres!). Up to 1911 we regarded it as a purely limestone species; but in that year it was again obtained near Dalwhinnie in several spots, both on gneiss and on granite, so it is probably of wide distribution in the Highlands. It has, so far, been observed as follows, chiefly on fairly dry rocks, but sometimes by alpine streams; the range of elevation varying from about 800 feet, in the north, to 2200 feet or more, further south:—

V.-c. 88, Mid Perth.—Hillside, Sgairneach Mor, facing and west of the Sow of Athole.

V.-c. 96, East Inverness. — Creag Dhubh, south of Loch Ericht; Coire Chuirn (adjoining Atholl Forest, v.-c. 89, East Perth); and Allt Beal an Sporain (halfway between Dalwhinnie and Dalnaspidal).

V.-c. 108, West Sutherland.—Near the Traligill River and the Allt-na-Glaice-Moire: also on a hill overlooking Loch Maol-a-Choire ("Gillaroo Loch"), near Inchnadamph.

NEW PLANTS FROM JAMAICA.—II.

(INCLUDING NOTES ON SOME LINNEAN SPECIES OF COCCOLOBA.)

By William Fawcett, B.Sc., F.L.S., & A. B. Rendle, D.Sc., F.R.S.

The genus *Coccoloba* dates from Linnæus's *Systema*, ed. 10, 1007 (1759), and was adopted from Patrick Browne's name *Coccolobis* (Hist. Jam. 209); Browne's name cannot be revived, as he gives no generic diagnosis. In the *Species Plantarum* (1753) Linnæus included the only known species, *uvifera*, under *Polygonum*; to this he adds in the *Systema* four, as follow:—

"*C. pubescens* C. fol. coriaceis orbiculatis. Pluk. Phyt. 222, f. 8." There is no specimen of this in the Linnean Herbarium, but Plukenet's specimens are preserved among his plants in Herb. Sloane. In *Species Plantarum*, ed. 2, 523 (1762), where the trivial name is misprinted *rubescens*, Linnæus cites in addition *C. grandifolia* Jacq. (Enum. Pl. Carib. 19 (1760)), which is undoubtedly the same plant, and also *Coccolobis arborea foliis orbiculatis* Browne, Jam. 210, and in his own copy of Browne's work at the Linnean Society, has written *C. pubescens* against this description.

"*C. excoriata* C. fol. coriaceis ovatis." The specimen in the Linnean Herbarium consists only of a leaf-bearing twig which we are unable to refer to any known species. Linnæus received the plant from Browne, and in his copy of Browne's *History* identifies it with Browne's *C. montana major arborea, foliis subrotundis, cortice levi*, which Browne calls "Mountain Grape-tree," and which he says is "frequent about the Cross in Clarendon." In Sp. Pl. ed. 2, 524, Linnæus cites, in addition to Browne's description, Jacquin's description of his *C. nivea* (Enum. Pl. Carib. 19), which is the same as *C. venosa* L., a distinct species. He also adds Browne's query, whether Plukenet's *Arbor indica, glycyrrhizæ*, &c., Amalth. 22, t. 363, f. 4 is the same species; this, as the specimen in Herb. Sloane shows, is not a *Coccoloba*.

"*C. venosa* C. fol. oblongo-ovatis venosis. Pluk. Phyt. 237, f. 4." There is no specimen in the Linnean Herbarium, but the original of Plukenet's figure is preserved in Herb. Sloane; it consists merely of leaves, the fruit represented in the figure is obviously not a *Coccoloba*, and is not found in the Herbarium. Linnæus does not cite Browne, but his diagnosis is copied from Browne's *Coccolobis*, no. 3 (Hist. Jam. 210), against which in his own copy he has written *C. venosa*. Browne also cites Plukenet's figure. In Sp. Pl. ed. 2, 523, Linnæus changed the name to *C. punctata*, and cites, in addition to Browne and Plukenet, Jacquin's diagnosis of *C. coronata* (Enum. Pl. Carib. 19), which is a native of Carthagena, in Colombia, and is, in our opinion, a distinct species. A leaf of *C. nivea* Jacq. from Jacquin's own herbarium in the National Herbarium shows this species to be the same as *C. venosa* L. This species is apparently widely distributed in the West Indies, but, although it is mentioned both by Browne and Swartz as being native, we have seen no specimen from Jamaica nor any later record of its occurrence there.

"*C. tenuifolia* C. fol. membranaceis ovatis. Browne, Jam. t. 14, f. 3." The excellent flowering specimen in Herb. Linn., received from P. Browne, is the species which has been recently described by Lindau as *C. jamaicensis* in Engl. Bot. Jahrb. xiii. 206 (1890). A fuller description of *C. tenuifolia* is given in the Flor. Jamaicensis published in the *Amœnitates* (v. 397, 1760), to which, in Sp. Pl. ed. 2, 524, reference is made, the original reference to Browne being also given. In his monograph of the genus, Lindau includes *C. tenuifolia* L. among "species dubiæ et oblivione dignæ" (*tom. cit.* 220).

Coccoloba Priorii. Arbor vel frutex. *Folia* parva coriacea glabra elliptica breviter acuminata, basi obtusa rotundatave, petiolata, nervis supra planis, subtus prominulis, venis supra inconspicuis, subtus densiuscule reticulatis planis. *Ochreæ* glabræ laxiusculæ persistentes infra tubulosæ, apice bidentatæ. *Racemi* folia subæquantes, geminati aut solitarii, terminales erecti laxiflori; rhachi, bracteis, ochreolis, pedicellis, perianthioque tomentellis; nodulis 1-floris. *Bractei* et *ochreolæ* minuti. *Pedicelli* apice articulati, bracteis multo longiores. *Fructus* . . . *C. tenuifolia* Griseb. Fl. Br. W. Ind. 162 (1859) non L. Type in Herb. Kew.

Leaves 4–8 cm. l., 2–4 cm. br.; petioles 7–12 mm. l. *Ochreæ* 8–12 mm. l. *Racemes* 4–8 cm. l. *Bracts* and *ochreolæ* scarcely ·5 mm. l. *Pedicels* 2 mm. l., patent. *Perianth*, tube 2–3 mm. l., lobes 1·5–2 mm. l.

Hab.—Jamaica, *Prior*!

Coccoloba nigra. Arbor vel frutex glaber. *Folia* coriacea anguste elliptica vel lanceolata, breviter petiolata; apice et basi obtusa, nervis venisque utrinque prominulis, venis dense reticulatis. *Ochreæ* laxæ ovatæ non tubulosæ persistentes. *Racemi* densiflori erecti terminales foliis breviores; nodulis plurifloris; rhachi nigrescente. *Bracteæ* triangulares coriaceæ nigrescentes. *Ochreolæ* bracteis multo longiores bilobæ mucronatæ membranaceæ, translucentes. *Pedicelli* breves. *Perianthii* tubus brevissimus. *Fructus* . . . Type in Herb. Edinb.

Leaves 6–10 cm. l., 2·5–4 cm. br.; petioles 4–5 mm. l. *Ochreæ* 8 mm. l. *Racemes* 7·5 cm. l. *Bracts* 1·5–2 mm. l. *Ochreolæ* 3 mm. l. *Pedicels* about 1 mm. l. *Perianth* about 3 mm. l.; tube less than 1 mm. l.; lobes elliptical.

Hab.—"Jamaica," *fide* Grisebach MSS. in Herb. Edinb. without name of collector; named by Grisebach "*C. punctata* L."

This species belongs to Lindau's section *Campderia*, and is therefore related to *C. venosa* L. (*C. excoriata* Lindau (non L.) in Engl. Bot. Jahrb. xiii. 211), but differs from this species in the leathery leaves and erect racemes.

Coccoloba neglecta. Arbor vel frutex ramulis glabris. *Folia* late elliptica, apice rotundata, basi acuta, obtusa rotundatave, nervis subtus prominentibus, venis inconspicuis. *Ochreæ* apice deciduæ, infra persistentes. *Racemi* foliis longiores subdensiflori, rhachi tomentella, nodulis 1-floris approximatis. *Pedicelli* brevissimi, sed ochreolis minutis multo longiores. *Fructus* late

ovoideus, basi rotundatus, perianthii lobis coronatus.—Type in Herb. Jam.

Leaves attached just above base of ochreæ, 5–7 cm. l., 3–4·5 cm. br., glabrous; petioles 5–6 mm. l. *Ochreæ* about 8 mm. l. *Racemes* 8–14 mm. l.; pedicels scarcely 1 mm. l. Flowers not seen. *Fruit* 8 mm. l. (incl. lobes), about 5 mm. br.; lobes 1–1·5 mm. l.

Hab.—In fr., Feb.; Green Valley, *Harris*! 5094.

This species is near *C. diversifolia* Jacq., but differs in the nerves, veins, rhachis, and fruit.

COCCOLOBA POLYSTACHYA Wedd. var. JAMAICENSIS. Ramuli, folia et ochreæ glabri, *folia* apice rotundata. Type in Herb. Kew.

Hab.—In fl., Jan.; interior of Westmoreland, *Purdie*!

The typical species occurs in tropical S. America, and is not known from the West Indies.

PILEA LAMIIFOLIA Fawc. & Rendle var. PUBERULA. *Caulis* et *folia* subtus ferrugineo-puberuli. *Cystolithi* valde inæquales, majores fusiformes minores punctiformes. *Perianthii* segmenti intermedii lobus lateralis latior.

Hab.—On rocks and logs in woodland; John Crow Mt., 1500 ft., *Harris & Britton*, 10,777.

GYMNOCOLEA ACUTILOBA IN BRITAIN.

BY D. A. JONES, F.L.S.

ON boulders and among scree on the north-western face of Rhinog Fawr, Merionethshire, and just below the summit at an altitude of about 2000 ft., there grows a hepatic which has puzzled British botanists for some time. It forms beautiful dark-green patches on the boulders, or grows in graceful strands among the fine tufts of *Rhacomitria* that adorn the vertical faces of those boulders. It was first found by Messrs. Cleminshaw, Owen, and the writer, in June 1910. We named it *Gymnocolea inflata* var. *heterostipa* (Carr. & Spruce) Lindb., a plant found many years ago on the Glyders by Mr. E. M. Holmes. The clue to the identification of this critical species was, however, supplied by Prof. Schiffner, of Vienna, to whom specimens were sent. He suspected it to be *G. acutiloba*, although the specimens were too immature to enable him to arrive at a final decision. In the meantime specimens were submitted to Dr. Kaalaas, of Christiania, who first described the plant. He was quite convinced, after comparing it with original specimens of *G. acutiloba*, that it belonged to that species. Perhaps it ought to be mentioned that Prof. Schiffner, after the examination of more mature plants, declared in favour of *G. inflata* var. *heterostipa*. Messrs. Macvicar and Pearson, who know the latter variety well, are inclined to accept Kaalaas' view on the matter. As Kaalaas remarks, the two species are, no doubt, very nearly allied to each other, and are probably connected by intermediate forms. The numerous intercalary postical branches, which are considered the most striking character of *G. inflata* var. *heterostipa* are not present in the Welsh plant to the same extent, as compared with the lateral branches. The latter, as a rule, have a "stutzblatt" or one-lobed, widely lanceolate, rarely bilobate leaf, at their base. The lobes of the leaves in our plant agree with *G. acutiloba* in being acute, whereas in *G. inflata* var. *heterostipa* they are obtuse. The leaves are also more erect and turned forwards. It differs only from the original in having the leaves more distantly placed on the stem, on account of which Kaalaas suggests the name *acutiloba* forma *laxa*.

The following is a translation of Kaalaas' original description, slightly modified:—

"Only sterile plants known. In complete *tufts*; brownish green when dry, brown to blackish brown, 1–1·5 cm. long; in habit somewhat like small forms of *Jungermannia inflata* or *Cesia revoluta*. Plants divided in a forked manner with specially shaped 'stutzblatt,' but also here and there having postical branches. *Stem* yellow or brownish green, little curved, creeping throughout its whole length by hyaline or brownish, fairly short radicles, about 0·14 mm. in diameter, composed of short rectangular cells, of which there are about twenty at the periphery. *Leaves* fairly distant, hardly touching each other, attached transversely or a little diagonally, not decurrent, erect or nearly so and, as a rule, slightly curved towards the postical side of the stem, 0·4 mm. long and 0·3–0·4 mm. wide, oval quadrate to inversely egg-shaped, with a distinctly narrowed base, somewhat concave, divided for $\frac{1}{3}$–$\frac{2}{5}$ into two lobes by a narrow, sharp, or rounded sinus; *lobes* narrowly egg-shaped to widely lanceolate or triangular, usually acute, more rarely somewhat obtuse, with incurved points, the ventral lobes most frequently somewhat larger, the dorsal edge (more rarely also the ventral edge) of the leaf having a blunt tooth at one corner. Occasionally three-lobed leaves are met with. *Leaf-cells* everywhere uniform in size, elongated and rounded, polygonal, 0·20–0·028 mm. long and 0·020–0·033 mm. wide, in the younger leaves filled with oval or rounded chloroplasts, cell-walls throughout, particularly at the angles, strongly thickened, without, however, any distinct trigones. *Under-leaves* usually absent, only evident here and there on innovations, small, subulate, and curved inwards."

Synonymy:—

GYMNOCOLEA ACUTILOBA K. Müll. Lebermoose, i. 745 (1910); Macvicar, Brit. Hepat. 158 (1912).

Jungermannia acutiloba Kaal. in Nyt. Mag. f. Nat. xl. 250 (1912).

Lophozia acutiloba Schiffn. in Hedwigia, xlviii. 187 (1909).

Pleuroclada acutiloba Steph. in Bot. Centralbl. cx. 317 (1909).

Distribution.—Grödener Tal, South Tyrol, on schistose detritus (*Schiffner*, 1899). Gross Alrtal, Salzburg, in copper mines (*Baumgartner*, 1908). Ravines near Eseli, in the Trapezant District. Asia Minor, on cuprous tufa (*Handel-Mazzetti*, 1903). Nesheimshorgen, in Granvin, Hardanger, Western Norway (*Haraas*, 1898); original. Rhinog Fawr and Bwlch Tyddiad above Cwm Bychan, near Harlech, North Wales, on sandstone grit.

It would be interesting to examine our copper mines for this rare species. Hitherto we have not succeeded in detecting it in Merioneth in such habitats, although all forms of *G. inflata* grow here very profusely.

In *Hedwigia*, xlviii. (pp. 187, *sqq.*) Schiffner describes and figures in a very interesting paper a variety *heterostipoides* of this species. It is a smaller plant, with closer and more concave leaves, sinus often narrower, lobes large, incurved, often obtuse, and rarely acute. He considers it to be an intermediate form between *G. acutiloba* and *G. inflata*, but nearer the former. It forms a connecting link between the two through the var. *heterostipa* of *G. inflata*.

ROSA AFZELIANA Fries.

By C. Traaen (Stabaek, Christiania).

Having for many years been in communication, exchanging observations and specimens, with Mr. W. Barclay, a keen student like myself of the genus *Rosa*, I have now come into possession of a very valuable collection of Scottish roses. As Dr. Almquist had last summer completed his work describing the Scandinavian forms of *R. Afzeliana* Fr. (=*R. glauca* Vill. × *R. coriifolia* Fr.), it came into my mind to make a closer comparison, according to Dr. Almquist's system, between the Scottish and the Scandinavian Afzelianæ. I mentioned this to Dr. Almquist, who took a great interest in my idea and promised to revise and correct my determinations. This he did, and I now give a brief summary of the result of our joint examination, in the hope that it may interest some British botanists. The specimens examined, in number nearly ninety, were found to contain about thirty-eight of Dr. Almquist's types. A few were doubtful, owing to the material being defective.

It appears that the Scottish Afzelianæ exhibit a great similarity to those of Scandinavia. Among the Scottish forms we meet with many that, with us, are peculiar to West Scandinavia (*R. glauca Kattegatensis* Almq., *Palmeri* A. & M., *prolongata* A. & M., *Lindstrœmii* Almq., *lævigata* Winsl., *R. glauciformis* Almq., *arietaria* Mts., &c.). Naturally, some of wider distribution also occur in Scotland, some, *e.g.*, which are found in Southern Sweden. On the other hand, the green-leaved glabrous subspecies, so common in Northern Scandinavia, seem to be wanting in Scotland, with the exception of the widely spread *R. virens* Wahl. subspecies *elata* Mts.

With regard to the leaves, there is no difference so far as respects their consistency, but there is a remarkable difference in regard to their clothing. On the west coast of Norway hairy-leaved forms of *R. Afzeliana* are very rare, but increase in number as you proceed towards the east. In Eastern Norway, and in Central and Southern Sweden, hairy green-leaved forms are by far the most frequent. In Scotland again, according to Mr. Barclay's collection, hairy glaucous forms seem to be most prevalent. Amongst these it is interesting to find a subspecies not as yet found in Scandinavia, which we have named *R. glauciformis* Almq. subspecies *prolongatula*, and which is described in the sequel. It belongs to Almquist's subgroup Halogenæ, so called because its members are found only in the vicinity of the sea-coast. No hairy subspecies of this group has up to the present been found in Scandinavia.

Several hairy subspecies with compound leaf-teeth, occurring frequently in Scotland, are specially remarkable for their subfoliar glands. These are usually confined to the midrib and secondary nerves, but in some cases are spread over the whole under-surface (*R. glauciformis* subspecies *glaucifrons* A. & M., *defirmata* Mts., *inserta* Mts., *decurtatula* Almq., *insertiformis* Almq.). In this respect the Scottish Afzelianæ are much more differentiated than the Scandinavian, which very rarely exhibit glands on the nerves. As regards serration, the Scottish forms generally have the teeth smaller and narrower.

In spite of the differences above-mentioned there is no difficulty in identifying the Scottish forms with those of Scandinavia, according to the principles set forth by Dr. Almquist. Where any determinations are doubtful, the doubt is to be ascribed to defective material.

Besides the above-mentioned new subspecies belonging to the Halogenæ—*R. glauciformis*, subspecies *prolongatula* Almq. & Tr.—other new subspecies were found in Mr. Barclay's collection. One of these is green-leaved glabrous, the other green-leaved hairy, both corresponding to the glabrous glaucous form *R. glauca* Vill. subspecies *lævigata* Winsl. For these Dr. Almquist proposes the names respectively of *R. virens* Wahl., subspecies *scotica* Almq. & Tr., and *R. virentiformis* Almq., subspecies *Barclayi* Almq. & Tr.

The diagnoses of the three new subspecies may be given as follows:—

ROSA GLAUCIFORMIS Almq., subspecies PROLONGATULA Almq. & Tr.—Leaflets rather thin, pubescent on under surface, glaucous dull green, the uppermost on the flowering branches ovate elongate, acuminate, narrow below; the middle leaves with leaflets obovate, prolonged or elliptical, roundish at the top, narrow or cuneate at the base; the lowest leaves with leaflets prolonged obovate, cuneate based. Teeth acuminate, deep, close; of the upper leaflets a little outward turned, of the middle nearly straight, of the lowest incurved. Prickles weak, projecting, feebly curved. Fruit pyriform.

ROSA VIRENS Wahlenb., subspecies SCOTICA Almq. & Tr.—Leaflets glabrous, light green, very firm, almost cartilaginous, the uppermost on the flowering branches ovate, sublanceolate, acuminate; middle leaves with leaflets elliptical, the base narrow roundish or cuneate; lowest leaves with leaflets broad obovate, cuneate based. Teeth of the upper and middle leaflets deep, straight; of the lowest incurved, coarse. Prickles projecting, point curved, more or less strong. Fruit oval, narrowed below.

R. VIRENTIFORMIS Almq., subspecies BARCLAYI Almq. & Tr.—Similar to subspecies *scotica*, except for the pubescent leaves on under surface. Upper leaflets of the flowering branches ovate elongate, acuminate, narrow based; middle leaflets elliptical ovate; lowest broadly obovate, oval, narrow at the base. Teeth of the upper and middle leaflets straight; of the lowest incurved, coarse. Prickles projecting, strong, point curved. Flowers deep red. Sepals with many lanceolate pinnæ.

In Almquist's system *R. Afzeliana* Fr. = *R. glauca* Vill. × *R. coriifolia* Fr.

Almquist divides *R. Afzeliana* Fr. into four subgroups, viz.:—

R. glauca Vill. = glaucous forms of our *R. glauca* Vill.
R. glauciformis Almq. = ,, ,, ,, *R. coriifolia* Fr.
R. virens Wahlenb. = green ,, ,, *R. glauca* Vill.
R. virentiformis Almq. = ,, ,, ,, *R. coriifolia* Fr.

PLANTS FROM WESTERN CHINA.

By R. S. ADAMSON, B.A.

THE following is an account of a small collection made by Mr. F. K. Ward on a recent expedition in China in 1909–10. The plants were collected in the mountainous regions round Tatsienlu, in W. Szechwan, and in S. Kansu Mts. The collection was sent to Professor Seward at Cambridge, who kindly handed the plants over to me for investigation. The specimens are in the Cambridge University Herbarium. I have to acknowledge considerable help from Dr. C. E. Moss, of the Cambridge University Herbarium, and also from Dr. O. Stapf and other members of the staff of the Kew Herbarium during the process of identification of the specimens, many of which were unfortunately very small.

The collection contains five new species, three of which are now described; the others will be described by Mr. R. A. Rolfe.

The nomenclature is in most cases that adopted in Mr. Hemsley's *Enumeration of Chinese Plants*.

Juncus modicus N. E. Brown, or near this species. Tatsienlu.

Tovaria tatsiensis Franchet, or near this species.

Disporum pullum Salisb. Tatsienlu. Pikow, S. Kansu Mts.

Polygonatum erythrocarpum Hua, or near this species. Tatsienlu.—*P. latifolium* var. *commutatum* Baker.

Oligobotrya Henryi Baker. Tatsienlu.

Paris polyphylla Sm. Tatsienlu.

Trillium Tschonoskii Maxim. Tatsienlu.

Ophiopogon japonicus Ker, var. *Wallichianus* Maxim. Tatsienlu.

Aletris lanuginosa Bur. & Franch. Tatsienlu.

Cypripedium arietinum R. Br. Tatsienlu.

Orchis Chusua D. Don. Tatsienlu.

Cephalanthera erecta Lindl. Pikow, S. Kansu Mts.

Cœlogyne præcox Lindl. Tatsienlu.

Oreorchis nana, *O. Wilsonii* Rolfe spp. nov. ined. Tatsienlu. To be described.

Houttuynia cordata Thunb.

Schœpfia jasminodora S. & Z.

Aristolochia moupinensis Franch. Tatsienlu.

Polygonum eriopolitanum Hance. Hupei Prov.

Aquilegia vulgaris L. Tatsienlu.—*A. ecalcarata* Maxim. Tatsienlu.

Delphinium minutum Lév. & Vaut. Pikow, S. Kansu Mts.

Anemone chinensis Bunge. Honan.—*A. obtusiloba* Don. Tatsienlu.

Oxygraphis glacialis Bunge. Tatsienlu.

Epimedium sagittatum Baker.

Schizandra elongata Hook. f. & Thoms.

Meconopis integrifolia Franchet.

Drosera peltata Sm. Szechwan.

Saxifraga sarmentosa Linn. f. Tatsienlu.

Deutzia discolor Hemsl.

Pittosporum pauciflorum Hook. & Arn.

Spiræa cantoniensis Lour. (= *S. lanceolata*). Tatsienlu.

Neillia rubriflora D. Don. Tatsienlu.—*N. sinensis* Oliv.

Kerria japonica DC. Pikow, S. Kansu Mts.

Potentilla ambigua Cambus.

Desmodium tiliæfolium G. Don. Tatsienlu.

Gueldenstædtia flava, sp. nov. Radix longus summus crassus. Caules pleures ramosi nodis basilibus radicatis glabri. Folii pinnati, longipetiolati. Stipulæ scariæ subrotundæ obtusæ. Petiolus glabrus. Folioli 7–9 distantes elliptico-rotundi obtusi vel apice retusi, basi breviter attenuati brevissime petiolulati subtus in venis marginibusque pilis flavis dense in aliis partibus et supra tenuiter, vestitis. Inflorescentia longe pedunculata foliis subæquantia vel paullo breviora axillaria. Pedunculi basi subglabri et supra pilosi, summa pilosissimi pilis brevissimis. Flores lutei vel flavi rare cœrulescentes umbellati pedicellis brevibus pilis fuscis vel atropurpureis tecti. Fructus non videtur.

Tatsienlu.

This is apparently the same as Pratt, No. 578, and Wilson, No. 3423, at present unnamed.

Xanthoxylum stenophyllum Hemsl.

Viola biflora L. Tatsienlu.

Elæagnus umbellata Thunb.

Helwingia chinensis Batalin. Pikow, S. Kansu Mts.

Pyrola rotundifolia L. Tatsienlu.

Cassiope selaginoides Hook. f. & Thoms. Tatsienlu.

Enkianthus himalaicus Hook. f. & Thoms. Tatsienlu.

Pieris formosa D. Don. Pikow, S. Kansu Mts.—*P. ovalifolia* D. Don. Szechwan.—*P. villosa* Hook. f.

Vaccinium setosum C. H. Wright.

Vaccinium Wardii, sp. nov. Suffrutex. Caules basi decumbentes, radicantes, supra ramosi pilis vel setis longis rigidisque

tenuiter tecti. Folii lanceolati, coriacei, serrati, breviter petiolati, apice acuti basi plerumque cuneati, venis infra prominentibus supraque valleculosis, infra et in petiolis pilis similibus caulibus tecti, superne glabri. Inflorescentia ramosa, axillaria pilis brevibus mollibusque intecta. Flores pedicellati. Bracteæ et bracteoli conspicue persistentes, flores fere æquantes. Flores parvi rubri. Calyx dimidio corollæ brevior. Corolla purpurea subglobosa.

Tatsienlu.

This species is rather closely allied to *V. Forrestii* Diels.

Berneuxia Thibetica Decne. Szechwan.

Myrsine africana L.

Primula amethystina Franchet. Tatsienlu.—*P. Cockburniana* Hemsl. Tatsienlu. — *P. delexa* F. Duthie. Tatsienlu. — *P. dryadifolia* Franchet. Tatsienlu.—*P. incisa* Franchet. Tatsienlu.—*P. polyneura* Franchet. Tatsienlu.—*P. sikkimensis* Hook. Tatsienlu.—*P. muscarioides* Hemsl., or near this species.—*P. penduliflora* Petitmangin, or near this species. Tatsienlu.

Androsace chamæjasme Host. Tatsienlu. — *A. sarmentosa* Wall. Tatsienlu.

Jasminum Wardii, sp. nov. Perennis. Caules ramosi, juvenes quadrati angulis jugis parvis projectis, glabri. Folii simplices, parvi breviter petiolati lanceolati glabri acuti vel acuminati basi rotundati marginibus paullo revolutis. Flores plerumque ternati, terminales pedicellati pedicellos æquantes vel paullo superantes. Corollæ tubus calyce bis longior infundibuliformis limbus tubo paullo brevior. Stamina in medio tubo corollæ inserta.

Szechwan.

This is the same as Ducloux, No. 6, undescribed in Herb. Kew.

Gentiana Piasezkii Maxim. Pikow, S. Kansu Mts.—*G. rhodantha* Franchet.

Scutellaria amœna C. H. Wright. Szechwan. — *S. angulosa* Benth. Pikow, S. Kansu Mts.

Mazus rugosus Lour. Shensi Prov.

Didyssandra plicata Franchet.

Æschynanthus acuminatus Wall.

Pinguicula vulgaris L. Tatsienlu.

Chasalia curviflora Thwaites.

Viburnum erosum Thunb. var. *ichangense* Hemsl.

Abelia uniflora R. Br.

Dipelta floribunda Maxim. Pikow, S. Kansu Mts.

Lonicera stephanocarpa Franchet. Tatsienlu.

Leycesteria formosa Wall.

Aster hispidus Thunb. Shensi Prov.

Anaphalis pterocaulon Maxim. Shensi Prov.

Leontopodium japonicum Miq. Shensi Prov.

Gnaphalium hypoleucum DC. Shensi Prov.

Chrysanthemum sinense Sabine, var. *vestitum* Hemsl. Honan Pass.

Ainsliæa undulata Diels, or near this species. Pikow, S. Kansu Mts.

PHILIP MILLER'S PLANTS.

By James Britten, F.L.S.

The general though late recognition—due in great measure to the attention which has been called to it in this Journal—of the eighth edition (1768) of Miller's *Gardeners Dictionary* as a starting-point for species, has naturally been followed by a similar interest in the plants of his herbarium which represent such species. It is generally known that this herbarium was purchased by Banks and was incorporated in his own, which forms the basis of the National Herbarium; but the specimens from Miller are not always readily distinguishable and their significance may easily be overlooked. This difficulty is in process of being removed, as a printed label has been prepared which is being attached to the sheets of Miller's plants; it may however be worth while to bring together such information as throws light upon its general contents.

Philip Miller was appointed to the Chelsea Garden in 1722—the year in which it was conveyed by Sir Hans Sloane, who recommended his appointment, to the Apothecaries Company—and remained there until 1770, the year preceding his death. This is not the occasion to refer to his work in connection with horticulture, but his "extensive correspondence with persons in distant parts of the globe" added greatly to botanical knowledge; Pulteney, from whom this remark is quoted, says: "From the Cape of Good Hope, from Siberia, from North America, and particularly, by means of Dr. William Houstoun, from the West Indies, his garden, for a long series of years, received a plentiful and perpetual supply of rare and frequently of new species, which his successful culture seldom failed to preserve. It was the remark of foreigners that Chelsea exhibited the treasures of both the Indies" (*Sketches*, ii. 246). Houstoun (1695–1733) was the most important of Miller's correspondents, and at his death bequeathed to him "all his papers, drawings, and collection of dried plants;"[*] the plants were incorporated with Miller's herbarium, and are, with the MSS. and drawings, in the National Herbarium (see Journ. Bot. 1897, 225). It was through Miller that Linnæus became acquainted with Houstoun's plants; in the account of his own herbarium he writes: "Miller, of Chelsea, permitted me to collect many in the Garden, and gave me several dried specimens collected by Houstoun."[†]

Miller's herbarium was acquired by Banks about three years after his death; Solander, writing to Ellis on Dec. 21, 1774, says: "Mr. Banks has bought Miller's herbarium, and we have been busy these two weeks in getting it home and into some order. As there are a great many of Houstoun's plants from Vera Cruz, &c., I think it a valuable acquisition" (Smith, Linn. Corr. ii. 22).

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[*] Miller, *Figures of Plants*, i. 30 (1755).

[†] Pulteney, *General View*, ed. Maton, 575.

It was evidently an extensive collection; writing to John Bartram on Jan. 12, 1758, Miller says "my *Hortus siccus* is now replete with near ten thousand specimens, [and] I am very solicitous to make it as complete as I can."* In the preface to ed. 7 of the *Gardeners Dictionary* (1759) he says of the descriptions: "The far greater number are from the growing plants, which the author has under his care, and the others are from dried samples, which are well preserved; of which he has, perhaps, as large a collection as can be found in the possession of any private person." I do not think the collection as acquired by Banks can have contained anything like as many as 10,000 specimens.

The difficulty of determining which of the sheets in the Banksian collection are from Miller's herbarium is increased by the way in which these are endorsed. As is well known, at that period it was customary to write information on the back of the sheets, in accordance with Linnæus's direction (Phil. Bot. 7), "historica [altered in later editions to 'historia'] a tergo." Solander made this endorsement in three ways: sometimes he wrote: "Herb. Miller," which is of course clear enough, but at others he contented himself with "Hort. Chels." or "Hort.," and sometimes, I think, omitted even this. In many cases, the identity of the specimens is made clear by the presence on the sheets of labels containing the diagnoses from the *Dictionary* in Miller's own hand; in others it can be deduced from the pencil "tick" which was placed (no doubt by Solander) before the name of the plant in Banks's copy of the *Dictionary* at the time Miller's plants were received.

An illustration will make this clear. In the genus *Iris* in the National Herbarium are four of Miller's species represented by four specimens, to which are attached labels bearing the diagnoses of the *Dictionary* in his own hand:—*I. maritima* (n. 11), *I. bicolor* (n. 13), *I. sativa* (n. 15), and *I. picta* (n. 16); the first of these is endorsed "Hort.," the others "Hort. Chels." The three last are written up by Solander with Miller's name, followed in the case of the second and fourth by "Mill. Dict."; *I. maritima* has remained nameless until I wrote the name on it the other day, yet the identification is as unquestionable as that of the others. *I. verna* (n. 17) and *I. florentina* (n. 22) are not Millerian species, but "Mill." in Solander's hand follows their names, they are endorsed respectively "Hort." and "Hort. Chels.," and are "ticked" in the Banksian copy of the *Dictionary*. The evidence in this case is practically as conclusive as in the preceding instances.

The specimens doubtless were preserved by Miller loose in folded sheets, as was the case with the collection of Chelsea Garden plants sent to the Royal Society which, when transferred to the British Museum in 1781, were in that condition and remained so until they were incorporated with the National

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* *Memorials of Bartram*, p. 381.

Herbarium about 1884. The paper on which Miller's plants were laid out corresponds with that used by Banks; Miller's names were probably written on the wrappers and thrown away with them, which would account for the fact that, except when descriptive labels were included, there is no evidence in his hand to indicate the name of the species, and would also explain their being written up by Solander with the indication "Mill." or "M." which often follows or sometimes precedes the "L." appended to the name; they were no doubt laid out at the time the copy of the *Dictionary* was "ticked." Occasionally sheets containing mounted specimens bear names in Miller's hand, and these were no doubt found in that state in his herbarium—an example may be seen under *Milleria*, on which, by the way, as has sometimes happened, Solander's pencil MS. of the name has been darkened by a later hand, the character of the writing being thus somewhat altered.

The material for determining Miller's species is by no means confined to his own herbarium. A large collection of his Chelsea Garden plants is in the Sloane Herbarium, collected at dates extending from 1727 to 1739. The specimens, which are very good and are labelled in Miller's hand, will be found in the following volumes, some of which they occupy entirely: 228–30, 244, 294–5, 316–17, 323–4. In all except 228–30, in which they are pasted on, his labels are written on the folios; the sheets would thus seem to have been prepared by Miller—the title to H. S. 296 states, in Sloane's hand, that the specimens contained in it were "gathered, dryed, and fastened" by Miller himself.

Further information as to the plants cultivated in the Chelsea Garden during Miller's rule may be obtained from the lists of the plants which, in accordance with the terms of Sloane's conveyance to the Apothecaries Company, were sent annually to the Royal Society—"fifty specimens of distinct plants, well dried and preserved, which grew in the garden the same year, with their names or reputed names; those presented in each year to be specifically distinct from every former year, until the number of two thousand shall have been delivered." These lists appear in the *Philosophical Transactions* from 1722 to 1774—a period which only slightly exceeds the term of Miller's Curatorship of the Garden (1722–1770). Miller himself, however, seems to have had nothing to do with this part of the work, which devolved upon the official who was styled "Demonstrator of Plants and Præfectus Horti." Nos. 1–900 of the lists were transmitted by Isaac Rand (1722–39); nos. 901–1250 (1704–46) by Joseph Miller; nos. 1251–2150 (1747–64) by John Wilmer; nos. 2151–2400 (1765–69) by William Hudson; nos. 2401–2500 (1770–1) by Stanesby Alchorne; nos. 2501–50 (1772) by William Curtis. The specimens representing these were in 1781 transferred to the British Museum and are now incorporated with the National Herbarium, where are MS. lists, apparently never published, carrying the numbers on to 3150; from 1781 inclusive the plants seem to have been sent directly to the Museum from the Garden; the last 50 were delivered in

1784. The provision that the plants presented in each year should be specifically different from those of every former year was by no means strictly carried out; the interest of the specimens is very limited, as they consist for the most part of plants commonly cultivated at the period, their only relation to Miller being that they were grown during his Curatorship.

PLANTS EPIPHYTIC UPON PALMS AT HYÈRES.

By H. Stuart Thompson, F.L.S.

It may be interesting to publish a list of the Phanerogams growing upon the Palms at Hyères on the French Riviera, as observed during December and the first week of January.

The Palms of the streets and public places are the Date Palm (*Phœnix dactylifera*) and the shorter *P. canariensis*.* The town is noted for its beautiful avenues of Palms, and in the Avenue Gambetta they are intermingled with that graceful Pine-like angiosperm *Casuarina tenuissima*. In that street there are a number of seedling *Casuarina* upon the Palms, the two largest being respectively three feet and five feet high.

As is to be expected, most of the epiphytic plants grow on the lower half of the trees, and sometimes *Parietaria ramiflora* and *Stellaria media* on the portions of the roots above ground. The older trunks often have the appearance and colour of rough cork; and between the remains of the leaf-bases a fibrous material, like decaying cocoanut matting, is often visible. This is apparently derived from scale-like structures between the leaf-stalks. It is this which forms a humus upon which seeds germinate, and it is often aided by accumulations of Pine and *Casuarina* needles. Doubtless, wind and birds are the chief agencies of dissemination. It may be mentioned incidentally that in November each year the Palms and other trees in the streets of Hyères have their dead leaves and branches carefully cut off, in order to make them look tidy for the approaching season.

The Palm most covered with vegetation is one just off the Avenue des Iles d'Or. On this tree is a specimen of *Pinus halepensis*, two feet high (the commonest Pine in the district), three small fig trees, a couple of wheat plants in fruit, and a mass of *Sonchus oleraceus*, *Cotyledon Umbilicus* with dead flowering spikes a foot long, *Geranium rotundifolium*, *Sedum dasyphyllum*, and *Piptatherum multiflorum*, a handsome grass very common in the neighbourhood. On a Date Palm at the entrance to the Hôtel des Iles d'Or is an *Opuntia Ficus-indica*, a yard across, springing from a woody stock six inches thick. On another tree in a garden are several specimens of an *Agave* and a small kind of *Cactus*.

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* A short avenue of *Pritchardia filamentosa* = *Washingtonia robusta*, near the Jardin d'Acclimatation, has little or no vegetation upon the trees, some of which are 7½ feet in circumference.

It is remarkable that no ferns were observed, though *Adiantum Capillus-Veneris*, *Asplenium Trichomanes* and *A. Adiantum-nigrum* are so common in the immediate district.

In addition to the following list there were nine or ten plants in a winter state unfit for determination, including a couple of small woody shrubs, one of which had round, entire, smooth leaves. Doubtless this list is otherwise incomplete, and it probably could be added to in the spring or early summer. The great majority of the plants are either in flower or fruit this winter, and, therefore, may be considered as more or less permanently established upon the Palms.

Perhaps the most common species are *Parietaria ramiflora*, *Cotyledon Umbilicus*, *Erigeron canadense*, *Sonchus oleraceus* in various forms, from a variety with entire leaves to one with deeply cut pinnatifid leaves, like those of *S. tenerrimus*, *Sedum dasyphyllum*, and *Stellaria media*. The Ivy (*Hedera Helix*), *Kentranthus ruber*, and the Fig (*Ficus Carica*) are also quite frequent.

The following is a complete list of those sixty-eight plants whose genus at least I could determine with certainty in the winter. The names with an asterisk are escapes from cultivation.

Alyssum maritimum, extremely common on the Riviera, *Diplotaxis Erucastrum*, locally abundant in the fields, **Matthiola* sp., *Fumaria major*, *Fumaria* sp., *Stellaria media*, *Cerastium glomeratum*, *Geranium molle*, *G. rotundifolium*, *Erodium* sp., *Oxalis corniculata*, **Acacia longifolia*, *A. retinoides*, *Rubus* sp., *Sedum dasyphyllum*, *Cotyledon Umbilicus*, *Hedera Helix*, **Opuntia Ficus-indica*, **Cactus* sp., *Lonicera implexa*, *Kentranthus ruber*, *Phagnalon sordidum*, *Senecio vulgaris*, *Taraxacum officinale*, *Crepis* sp., **Anthemis punctata* (an Algerian species determined by Mr. F. Raine), *Erigeron canadense*, *Sonchus oleraceus*, *Calendula arvensis*, *Carduus* sp., *Andryala integrifolia*, *Campanula Erinus*, **Plumbago* sp., *Fraxinus excelsior* (three feet high), *Heliotropium europæum*, *Solanum nigrum*, *S. villosum*, **S. Lycopersicum* (Tomato), *Linaria Cymbalaria*, *Veronica Cymbalaria*, *V. agrestis*, **Antirrhinum* sp., *A. Orontium*, **Maurandia semperflorens*, *Lamium amplexicaule*, *Plantago lanceolata*, *Chenopodium murale*, *C. urbicum* (?), *Theligonum Cynocrambe*, *Euphorbia Peplus*, *Euphorbia* indet., *E. exigua*, *Urtica dioica*, **Ficus Carica*, *Mercurialis annua*, **Casuarina tenuissima*, **Agave* sp., **Narcissus* sp. (a robust plant with four leaves eighteen inches long), **Dasylirion gracilis*, *Asparagus acutifolius*, *Poa annua*, *Scleropoa rigida*, *Piptatherum multiflorum*, *Bromus* sp. (perhaps *B. madritensis*), *Kœleria* sp. (probably *K. phleoides*), **Triticum* (Wheat), **Avena* sp. (Oat), *Pinus halepensis*.

P. S. (later).—The following may be added to the above list: *Oxalis cernua*, *Viburnum Tinus*, *Rhagadidus stellatus*, *Vinca media*, and **Cupressus sempervirens*.

SPERGULARIA ATHENIENSIS ASCHERSON IN ENGLAND.

By G. CLARIDGE DRUCE, M.A., F.L.S.

THE history of this as a British plant is as follows:—In June, 1906, I found growing in mobile sand, on the foreshore near the railway between the Grand Hotel and the first tower, St. Helier's, Jersey, specimens of a *Spergularia*, which on my return home I identified as the above (see Rep. Bot. Exch. Club, 1906, 196 (1907), and Journ. Bot. 1907, 401). In the Jersey habitat, as several aliens occurred, a native status could scarcely be claimed for this Mediterranean species. I visited Jersey again in 1907 and 1910, but on each occasion too early in the year, and found to my disappointment that so many changes had taken place on the foreshore, that few of the plants that I had seen there remained, and no further specimens of the *Spergularia* were obtainable. In 1911 I visited Aldeburgh, in Suffolk, in order to search for a *Cerastium*, and gathered a quantity of Spergularias there, among which I have since detected *S. atheniensis*. This gives it a distinct status as a British plant, and its occurrence there is another instance of the extension of a Mediterranean plant spreading up the shores of Spain, Portugal, and Western France, and eventually reaching the eastern coast of England. In 1912 Dr. Vigurs collected some Spergularias at Par, Cornwall, one of which I discovered to be *S. atheniensis*; but Par is so full of aliens that we cannot claim the plant as a true native there until it is found in other places on the southern coast. In 1912 Mr. W. C. Barton was in Guernsey, and collected many Spergularias; among these are typical specimens from L'Erée on the northern coast, and others from Cobo less well-marked, but near the specimens distributed as *atheniensis* in the *Flora Italica Critica*, n. 792 and 792 *bis*.

The name dates from 1867, when it was published with synonymy by Ascherson in Schweinfurth's *Beitrag zur Flora Æthiopiens*, p. 305 (the name occurs earlier in the book (p. 267) but is there a *nomen nudum*). The following descriptions by Willkomm & Lange (as *S. campestris*) and by Rouy & Foucaud practically cover our plants, which in appearance resemble *salina* forms, but differ in their more repeatedly branching and denser cymes, small capsules and aphyllous inflorescences. The seeds are small, 0·5 mm. or less, somewhat pear-shaped, slightly compressed, papillate, but never winged; they resemble those of *rupestris*, but the capsules are smaller, the petals are shorter than the small calyx: the plant is in Britain apparently only of annual or biennial duration. The broadly triangular dull-coloured stipules, the lighter-coloured and papillate seeds, and absence of central rosette distinguish it from *S. rubra*.

"Annua, glanduloso-puberula, viscida, basi glabra, caulibus numerosis in orbem expansis prostratis vel adscendentibus, dichotome ramosis, 4–9" l.; foliis linearibus planiusculis mucronato-acuminatis, internodia plerumque elongata non æquantibus, stipulis brevibus ovatis acutis, basi connatis, sordide albis non micantibus;

cymis floribundis primo dichotomis postea racemiferis, racemis longis secundifloris, aphyllis stipulaceo-bracteatis; floribus breve pedicellatis, pedicellis calycem subæquantibus, fructiferis subrectangulo-patentibus; sepalis concavis subcucullatis oblongis obtusis late albo-marginatis, petalis calyce brevioribus roseis v. albis; capsula ovoidea calycem excedente, seminibus minutis pyriformibus compressis, margine altero valde incrassatis, basi attenuatis, sub lente minutissime tuberculatis, primo subfuscis demum atris. Tota planta sordide virescens vel canescens." Willkomm & Lange, Fl. Hisp. iii. 165, 1880.

"Plante annuelle ou bisannuelle. Feuilles allongées, linearies. Stipules le plus souvent ternes, subtriangulaires, presque aussi larges à la base que longues. Pédicelles plus courts que la capsule. Fleurs nombreuses, rapprochées en grappes assez sérrées ou en petites cymes denses. Pétales plus courts que les sépales. Graines d'un brun grisâtre." Rouy & Fouc. Fl. Fr. iii. 310 (1896).

It may be mentioned that, while Willkomm & Lange regard it as an annual, Rouy considers it annual or biennial, while Halácsy (*Flora Græca*, i. 251 (1901)) describes it as perennial. Although separated rather widely from *S. salina* by M. Rouy in his "Conspectus of French Spergularias" (Bull. Herb. Boiss. iii. 222 (1895)), in nature the difficulty will be to separate aberrant forms of one from the other; the chief points of distinction being the more slender habit, the fan-like spreading of the branches—"caulibus numerosis in orbem expansis"—the upper branches of which are aphyllous, the short peduncles and denser cymes of smaller flowers, the somewhat smaller papillate seeds, which are never winged, and by the base of the stipules being less enlarged. It apparently prefers dry sandy situations in the vicinity of the coast in full sun exposure.

ANDERS DAHL (1751–1789).

By B. Daydon Jackson, Ph.D., Sec. L.S.

The statement on p. 30 concerning Anders Dahl induces me to send a short note about him, as very little seems known about him outside his own country.

Dr. J. G. Acrel, who carried out the sale of the Linnean collections to Dr. J. E. Smith on behalf of the family of Linné, was not unwilling that they should remain in Sweden, for he applied to the Secretary of State, E. Schröderheim, that through him the King of Sweden, then in Italy, might be invited to buy them; probably the King was never informed of this request, but the delay in answering Smith's letter was no doubt due to Acrel waiting for an answer from Italy.

There was, however, another person in Sweden to whom Acrel turned, and that person was Baron Clas Alströmer. In his letter Acrel referred to the Baron as the "most enlightened Mæcenas of Natural History in Sweden," and whether he would allow the heirs of Linné to retain the "small herbarium" which the younger Linné had promised him, or else—which the heirs considered far more desirable—to purchase the collections in their entirety. The latter proposal Alströmer declined; "on account of his indifferent health he would be unable to make such good use of them as they deserved." Acrel also stated that this was confirmed by Alströmer's representative Dahl, unless the heirs would be contented with 2220 riksdalers, that is to say, less than half what Smith had declared himself ready to give; also that upon no condition would he forego the small herbarium.

Another attempt was then made by Acrel to induce Count Creutz, the Chancellor of the University, to acquire the collections for the University, but the final answer was that they were too costly (at Smith's price), and were not indispensable.

About this time Dahl himself intervened with an offer on money lent by the Gothenburg merchant, J. Mauhle, to buy the collections on his own account, and he was especially anxious that the Alströmers should know nothing of it until the sale was accomplished. There appears to be some doubt about this offer, but the fact remains that, next to Acrel, Dahl was seemingly the only Swede to take any active steps to preserve these treasures for his country. He even applied to the King, begging him to intervene and to stop their exportation, even if they were already on board ship. As a reason for this he alleged not only that he considered he had the heirs' promise before Smith's offer came, but that foreigners would reproach them with their inability to retain such valuable collections, and, further, the purchaser would be able to act as Dictator in Natural History, so that its lovers would have to impart their discoveries, that they might be compared with the Linnean collections and manuscripts; he ended by stating that he had had the good fortune during several years of being an inmate of Linné's house until his death. Dahl, indeed, was the last amanuensis employed by Linné, always excepting his own son, and the use the acquisitive Dahl made of his opportunities may be seen in Prof. Lindman's article, "A Linnean Herbarium in the Natural History Museum in Stockholm" (Ark. f. bot. vii. 1908, No. 3). Dahl was the possessor of a thick shock of hair, and thus obtained the name of "Mop-headed Dahl"; Thunberg probably alludes to this fact in his *Dahlia crinita* (= *Trichocladus crinitus* Pers.). Later he became assistant to Baron Clas Alströmer and superintendent of his museum; of his industry in getting plants from the Linnés, father and son, Prof. Lindman has given a very interesting account in the paper just cited, pages 6-8, and throughout the remainder of the article on the Linnean plants now in the keeping of the Natural History Museum in Stockholm.

The result of Dahl's appeal to the King was to extract a statement from the Outwards Customs Department, dated 8th October, 1784, that the vessel with the collections on board had passed Dalarö, at the entrance of the sea-channel from Stockholm, on the 29th September, outward bound, and that therefore it was altogether too late to effect anything. The vessel actually passed Helsingborg on the 5th October, and was already out of Swedish waters and on the high seas when the official document was drawn up.

BIBLIOGRAPHICAL NOTES.

LII.—JACQUIN'S 'SELECTARUM STIRPIUM HISTORIA ICONIBUS PICTIS.'

SYSTEMATISTS are indebted to Nicolaus Joseph Jacquin (1727–1817) for many fine phytographical works, of which the subject of the present note is an admirable example. This work embodies the botanical results of a four years' stay in the West Indies and the adjacent mainland from 1755 to 1759, and gives us a very fair idea of Jacquin's merit as a botanist, and of his ability as an artist. It had been preceded in 1760 by a brief enumeration of the plants collected by himself and his assistants, and in 1763 by the first edition of the *Stirpium Historia*, containing ample descriptions of the plants, and illustrated by 183 rather crude copper-plates after his own original drawings; this is a small folio, published at Vienna, and is comparatively common; copies are readily obtainable for about 30*s*.

The imperial folio edition with coloured plates is extremely rare: a copy was sold in England a few years ago for £225 (Junk, *Bibl. Bot.* no. 963, 1909). The number of copies of this edition, which was issued at Vienna about 1780, is given by Pritzel (*Thesaurus*, ed. 2, no. 4363) as eighteen, but this is at variance with the record left us by Ebert whose entry is worth quoting here. He writes: "It is asserted that not more than twelve copies exist (consult *Bibl. Firmiana*, T. 3, P. II., p. 61; *Esprit des journ.*, Janv., 1782; *Cobres Katal.* II., 590; *Catal. Bibl. Banks.* III., 188), and the copy in the Royal Library at Dresden was bought in 1818 for 500 dollars. Besides this edition, a MS. list of Jacquin's writings drawn up by the bookseller Artaria, which I have before me, also mentions *Ejusdem operis editio picta* with 264 tables painted by the hand, of which only twenty-five copies exist" (*Bibl. Dict.* ii., 833, 1837).

London possesses three copies of this work, others are at Vienna and Göttingen, in the Royal Libraries at Berlin and Dresden, the Library of Congress at Washington, and in the New York Botanical Garden; an account of the acquisition of the last of these is given by Mr. J. H. Barnhart in the *Journal* of that institution for 1912 (p. 99). We are thus able to locate nine of the copies issued. Of those in London two are at the British Museum at Bloomsbury, in the Banksian and King's Libraries respectively; the other is in the Department of Botany at South Kensington. From the botanist's point of view these are identical; but the bibliographer observes several differences: the matter is the same in each, but the "make up" is different

The title-page and plates are drawn and coloured by hand. The wording of the title is: "Nicolai Josephi Jacquin, Selectarum stirpium Americanarum historia, in qua ad Linnæanum systema determinatæ descriptæque sistuntur plantæ illæ, quas in insulis Martinica, Jamaica, Domingo aliisque, et in vicinæ continentis parte observavit rariores; adjectis iconibus ad autoris archetypa pictis." The border round this is similar in the Bloomsbury copies, but differs from that in the copy at South Kensington, which is from a much finer design. The Banksian copy has a half-title, and at the end of the text a "Prospectus stirpium contentarum" of two pages, which do not appear in the others. The text is also in larger type and occupies 137 pages, with an "Explicatio Tabularum" of three pages; in the other copies, the typographical differences between which are mainly due to resetting, the collation is pp. 136, iv. The Berlin copy agrees with the Banksian in this respect (see Urban, *Symbolæ Antillanæ*, i. 77). The nomenclature of the first edition is revised, and Linnæus's *Systema Vegetabilium* ed. 13, 1774, is cited throughout. The 264 plates are copied from originals by Jacquin, and are of equal merit in the three copies examined; up to 258 each plate is devoted to one plant, the remainder have fragmentary figures of nearly a hundred different species. They are from the original drawings which were used in the preparation of the copper-plate illustrations of the first edition, in which, however, many of these plates do not appear. Reduced to octavo size, they were issued at Nuremberg in 1785?–1789 under the title *Dreyhundert auserlesene Amerikanische Gewächse*, a most indifferent production. Several of the plates are omitted, others are added from J. S. Mueller's *Illustr. Syst. Sex.* (1775-77), and Trew's *Pl. Select.* (1750–77); t. 69=P. Miller's *Fig. Pl. Gard. Dict.* t. 180, and t. 94 is from Jacquin's *Misc.* i. t. 4. The text was re-issued in octavo size at Mannheim in 1788, and can be bought for a few shillings.

F. G. Wiltshear.

SHORT NOTES.

Two Alchemillas.—1. Last summer I collected a series of *Alchemilla vulgaris* forms in Scotland, and when sending them to Dr. H. Lindberg, of Helsingfors, for confirmation of the names, Mr. G. C. Druce allowed me to include an example of "*A. acutidens*" from Ben Lawers, collected by Dr. Ostenfeld (see Journ. Bot. 1912, 201). The example has been returned, labelled "*A. alpestris* Schm., specim. autumnale!" by Dr. Lindberg, who tells me that Dr. Ostenfeld has also sent him two further examples which are exactly the same thing. Unless the specimens of *A. acutidens* from other British localities (Journ. Bot. *l. c.*) prove to be different from the Ben Lawers plant, the name must for the present be withdrawn from our lists.

2. During 1912 *Alchemilla vulgaris* was reported to me from

Hambledon, Surrey, and an example forwarded for examination. To my intense surprise it was undoubtedly *A. pubescens* Lam. Mr. E. B. Bishop, the discoverer, kindly took me to the spot and showed me the plants—a clump of three or four—*in situ*; the locality was a sandy, gorse-and-heather-growing situation, and there was nothing "suspicious" in the neighbourhood. I was not, however, quite satisfied that it should be considered a new British plant without further investigation, and, on making some enquiries in the village, and obtaining particulars in other ways, eventually it was ascertained that its origin was to be explained in quite a simple manner. I cannot do better than quote from a letter from the former owner of a large house not very far from the spot where the plant grew:—"I remember the plant quite well. I probably got it in Norway in 1891, but am not now certain. When I sent plants by post my gardener used to put them in the shade of a very high hedge to the west [in the garden]. I remember the plant being there. At the point you say the plant was found, rubbish from that corner of the garden used to be thrown, as the gorse and the conformation of the ground concealed it. Either the plant was grubbed up and thrown there after I left or its seeds were put there with other stuff when tidying up." I have given this explanation at some length as showing how necessary it is to make enquiries before publishing a "new record," there being nothing as regards distribution, latitude, &c., against *A. pubescens* being native in this land.—C. E. Salmon.

Sagina scotica Druce (p. 89).—Mr. Bennett writes that a plant which my wife and I collected (August 20th, 1887) on the very summit of Ben Lawers (3984 ft.), associated with *S. nivalis* Fr. and *S. saginoides* Dalla Torre (*S. Linnæi* Presl; *S. saxatilis* Wimm.), is this species. The robust habit, long pedicels, and large capsules (many of which had already shed their seeds, though others contained plenty) at once caught my eye; and I appear to have written to him that "it seemed very different from *saxatilis*, when fresh; the plant figured in Sm. E. B. as *Stellaria saginoides*." He kindly sent specimens of this and other Ben Lawers gatherings, made on the same day or four days later, to Prof. J. Lange, of Copenhagen, who called them "*S. saxatilis*, forma"; I accordingly left them under that, and for a long time forgot the matter. Mr. Bennett urges (and I fully concur) that E. B. 2105 is really *S. scotica*. This can hardly be a hybrid between *S. procumbens* and *S. saginoides*, both of which have smaller fruit and petals (usually none, in the former); and I quite think that Mr. Druce is right in describing it as a species. Dr. Moss showed me roots of *S. scotica* growing in his Cambridge garden, early last June; and, *at that stage*—not yet flowering—the resemblance to *S. procumbens* is great. I have specimens of good *S. scotica* from Craig-an-lochan, near Killin, 88 Mid-Perth; Canlochan Glen, 90 Forfar; and Meall Buidhe (adjoining Ben Dothaidh, where Mr. Druce found it), 98 Argyle. Some other gatherings in my collection may belong here, but are not so fully developed.—EDWARD S. MARSHALL.

SCIRPUS SETACEUS L. var. MAJOR Lej.—In the year 1896 the late Mr. A. Somerville sent me specimens of the above species with a distinctly creeping rootstock. All the Floras I consulted insisted on this being "cæspitose" or "tufted," and I could find no mention of such a form. A short time ago, looking up some plants in Lejeune's *Revue de la Flore des Environs de Spa* (1824), I found (p. 12) a "var. *major*, radice subrepente. Obs. Cette variété, beaucoup plus robuste et plus élevée que l'espèce, n'est pas comme elle disposée en gazon dense, au contraire ses chaumes sont souvent isolés et la racine est bien rampante." Mr. Somerville's plant only differs in being of the usual size of the species. —A. BENNETT.

CULINARY MINTS.—In this country *Mentha spicata* L. (*viridis* L.) is now, no doubt, the usual "mint" of kitchen gardens. Mr. W. Watson, of Chislehurst, however, tells me that "in S. W. Norfolk they cultivate *M. rotundifolia* L. exclusively in their gardens for sauce"; and that an allotment-holder at West Chislehurst grows *M. gentilis* L. for the same purpose. I once found *M. alopecuroides* Hull (*aquatica* × *rotundifolia* ?) spreading out of a cottage garden near Grayswood, between Witley and Haslemere, Surrey. Probably this does not exhaust the number of forms which have been grown; and the importance of former cultivation as the origin of many well-established colonies should not be overlooked. —EDWARD S. MARSHALL.

REVIEWS.

LINNÆUS.

(1) BAILEY, Sir WILLIAM HENRY. *Linnæus and the Reign of Law.* Rep. and Proc. Manchester Field Naturalists' Society, 1910 (1911), pp. 69–75.

(2) GRIFFITHS, A. B. *Biographies of Scientific Men.* London (Sutton) 1912, pp. xvi, 203, illustrated. [Linnæus, pp. 62–74, portrait.]

(3) GREENE, EDWARD LEE. *Carolus Linnæus.* With an Introduction by BARTON WARREN EVERMANN. [And "Linnæus as a Zoologist," by Dr. WILLIAM H. DALL.] Philadelphia (Sower Co.) [1912] pp. 91, 2 portraits.

THESE three works have been grouped as their intention is to give a popular account of the great Swedish naturalist. With so praiseworthy an object, it is to be regretted that the respective authors of the first and second works should have been content to repeat, or even to amplify, statements which are not supported by evidence. This may be partly attributed to the want of a good life of the illustrious Swede in English, corrected to the present standpoint of knowledge, but it is to be feared that the actual facts have been enlarged not from knowledge but from guesswork, a distorted image being the result.

That the above criticism is not too severe, some extracts are subjoined, and the actual facts added for comparison.

(1) Sir William Bailey speaks of "Baron von Linnæus" (p. 70); Linnæus was ennobled in 1761 and took for name Carl von Linné in consequence, but he never attained the rank of baron.

"In the account of Linnæus taking several men to Lapland, there is a description of the method in which this man of genius divided the labour. . . . Another had to study the manners and customs of the Laplanders. . . . The only one in the company who had no watch was the leader, for Linnæus could tell the time of day or night by the opening or closing of the flowers. He suggested a botanical clock" (pp. 73–74).

This account is confused with the journey to Dalecarlia (Dalarna), which was done in company, each member having his own duties specially assigned to him. The Lapland journey was a solitary expedition save for the occasional local guide.

Sir J. E. Smith did not present the Linnean collections as stated to the Linnean Society; they were bought by subscription after his decease.

(2) Of the fifteen worthies whose lives are given in the second volume cited above, Linnæus is the sole botanist, and consequently the only one to be mentioned here. The author tells us in his preface that "the biographical, historical, and scientific details have been compiled from the best available sources." The biography of Linnæus must therefore be the exception to the rule, for statements are made regarding him which do not agree with the "best available sources." Many, if not most, appear to have been taken without sufficient care from Trapp's translation of Stöver's life, and the portrait has been taken from that work, but reversed in reproduction. In order to show that these are no random assertions, some passages are cited below, followed by a narration of the actual facts.

1. "In the same year that England and Scotland were united into one kingdom, and two days after the Act of Union came into operation (3rd May, 1707) there was born at Roëshult, Sweden, Carl Linnæus, the father of modern botany" (p. 62).

The Act of Union took effect on the 1st May, 1707, O.S. = 12th May N.S.; Linnæus was born at Råshult on the 13th May, Swedish Old Style, corresponding to the 23rd May, New Style elsewhere.

2. "He was so enraptured with botany that he was compelled to confess to his father that he had no inclination whatever for the ministry. This was such a severe blow to the father that, without further delay, Carl was apprenticed to a bootmaker" (p. 63).

The account as given by Prof. Fries is as follows:—The master of whom he [*i. e.* Nils Linnæus] enquired, declared decidedly and simply that his son, as regards the subjects requisite for becoming a priest, was hopelessly deficient, and that he would far better succeed as a workman—a joiner or tailor. (In a note Prof. Fries remarks that this episode of his youthful days made so little impression upon him, that he passed it over without a word in his earlier autobiographies, and only in later years did he refer to it as a piquant matter.) The result of the advice so given was as follows:—"Deeply depressed he [the father] came afterwards to Dr. Rothman, to whom he confided his troubles, and he did not remain unhelped. Rothman stated that, so far as Carl was concerned, the schoolmaster was right, he would never become a priest, but, on the other hand, he was sure that Carl would become an eminent medical man, by which he could maintain himself as well as by being a clergyman." Rothman also undertook to take the young man into his own house, and to give him special instruction for the University.

3. "In 1730 Linnæus was appointed Lecturer on Botany at Upsala. The vivacity and novelty of his lectures charmed his audiences, and he was greatly esteemed by the college authorities" (p. 68).

Linné was appointed by Rudbeck to be his deputy, although still a student, an irregularity which was only suffered by the University because of the want of a graduate to fill that place; it was ended after Nils Rosén came back to Uppsala, having taken his doctor's degree at Harderwijk.

4. "The Royal Academy of Sciences sent Linnæus to collect the flora and fauna of Lapland . . . and in 1748 he published a book on his travels" (p. 68).

The Academy named was not founded till seven years later, not until Linnæus had returned to Sweden from his eventful journey to the Netherlands. The Society which commissioned Linnæus to explore Lapland was the Royal Society of Sciences (Regia Societas Scientiarum) at Uppsala. The *Flora Lapponica* was published in 1737; the volume "in 1748" is probably the "Oländska och Gothländska resa" of 1745.

5. "On his return Linnæus was elected a member of the Kongliga Svenska Vetenskaps-Academien (Stockholm) . . ." (p. 69).

Linnæus was one of the founders and the first president, in 1739. The rest of the paragraph is equally at fault.

6. "In 1735 he set out for Holland, spent some time at Leyden, obtained his medical degree . . ." (p. 69).

The degree was taken at Harderwijk, not Leyden.

7. "Clifford's gardens and hot-houses were an El Dorado for Linnæus, and from this home he wrote and published his *Fundamenta Botanica* and *Bibliotheca Botanica* (1736). Both of these books established his fame, and attracted attention in all parts of Europe" (p. 70).

These two books were already written when he left Sweden, although he probably added some book-titles to the *Bibliotheca* while with Clifford; but his *Systema Naturæ*, *Flora Lapponica*, and *Genera Plantarum* created greater astonishment. The books he wrote at Hartecamp were the *Musa Cliffortiana*, *Viridarium Cliffortianum*, and the splendid *Hortus Cliffortianus*.

8. "Owing to the financial difficulties of Cliffort, Linnæus was obliged to leave the beautiful and historic gardens at Hartecamp; but shortly afterward he obtained employment in the botanical garden at Leyden" (p. 71).

Linnæus left Clifford because the Dutch climate did not suit him; on his way home he was induced to stay at Leyden to help in rearranging the botanical garden there, and falling ill, was taken back by Clifford and nursed into convalescence. Clifford's pecuniary troubles occurred at a later period.

9. "Linnæus visited Leipzig, Saxony, Denmark and Paris" (p. 72).

He visited Paris and returned home by sea direct from Rouen to Sweden; his intended visit to Leipzig and Göttingen was broken off by his illness.

10. "In 1739 he married. . . . The next year he was appointed Professor . . . in the University of Upsala . . . and became its Rector" (pp. 72–73).

He became Professor in May, 1741 (not 1740), and in turn became Rector in 1750, 1759 and 1772, each time for six months, which then was the custom.

11. "He died of apoplexy on 10th January, 1778" (p. 74). He suffered from apoplexy, but the actual cause of death was ulceration of the bladder.

(3) The third work on our list is of quite a different stamp. It is the product of one who has studied the works of the master in a sympathetic spirit, with a desire to do justice to his subject. He even claims that he was in essence an evolutionist, and points to notes under *Thalictrum*, *Clematis*, *Beta*, *Achillea*, and *Cynara* in support. The contention is that Linnæus was forced by the dominant theology of his time to assert the permanence of species, yet in later life he is found giving expression to his doubt as to the correctness of this view in many cases.

But even in this little volume we find a few errors which should be noted. Celsius and Linnæus are said (p. 35) to have met "one autumn day"; the actual date was 8th April, 1729, very early spring in Uppsala. The portrait in Lapland dress is entitled "Carolus Linnæus as he appeared when starting upon his journey to Lapland in May, 1732" (p. 38). The dress was obtained during his journey, and served afterwards to please his friends at various times. On page 40 a letter is omitted from the name Harderwijk; Hoek (p. 29) should be Höök, and Burman, as a Dutchman, did not duplicate the final consonant of his name (pp. 45, 46) in the vernacular. But these are but small blemishes when we read the volume, written with such fresh, hearty good will and enthusiasm. In the present system of teaching botany, hosts of students are in danger of never acquiring a knowledge of those early workers whose pioneer efforts have formed the basis of present-day knowledge.

B. Daydon Jackson.

L'origine et le système phylétique des Angiospermes exposés à l'aide de leur arbre généalogique. Archives Néerlandaises des Sciences Exactes et Naturelles: Sér. III. B i. (1912), pp. 146–234. Seven figs. in text, and six phyletic tables. By HANS HALLIER.

THIS ambitious and, in many ways, remarkable essay represents, according to the author, his fifth attempt at a natural system of classification of the Angiosperms. In the brief introduction he claims that he has succeeded in defining sharply the limits of the various orders, and not unjustly criticises "*ce qu'on appelle* le système d'ENGLER" (the italics are ours) as marred by more than one "agglomérat tout-à-fait hétérogène."

The introduction, of about three pages, is followed by a lengthy "abrégé raisonné de ce système" (pp. 148–202). A list of twenty-three relative papers then precedes the exhibition of the system itself, which occupies the remainder of the work.

The essay reveals throughout the remarkable grasp of details and the familiarity with all the groups of Angiosperms which the writer undoubtedly possesses. He is thoroughly at home with his subject; but he affords us but a poor view of his household gods. He has, it would appear, endeavoured to compress into ninety pages what could hardly be made clear in five times that number; the result is that, although he makes us feel that *he* is sincerely convinced, he leaves *us* unconvinced: and this the more for not a few drastic alterations upon recognised systems which he urges upon our acceptance. Thus, to quote a few instances at random, Crassulaceæ are associated with the families comprised in Engler's Centrospermæ; Chloranthaceæ stand next to Lauraceæ: *Buxus* and *Batis* are included in Hamamelidaceæ; Boraginaceæ, including Lennoaceæ, are separated widely from their customary associates and appear close to Loasaceæ, Campanulaceæ, and Compositæ; "Amentaceæ," Urticaceæ, and Aceraceæ stand in close connection with Terebinthaceæ; Engler's Ebenales are entirely disintegrated—Symplocaceæ following close upon Celastraceæ, Ebenaceæ and Styracaceæ are included in Santalales, while Sapotaceæ, regarded as the progeny of Linaceæ, are assigned separate ordinal rank; Euphorbiaceæ are classed with Salicaceæ and Flacourtiaceæ in "Passionales;" Salvadoraceæ are reckoned among the near relations of Polygalaceæ; Primulaceæ and Myrsinaceæ are referred to an Ochnaceous ancestry and removed far from Centrospermæ—though Plumbaginaceæ are associated with the last-named group.

At the outset of his exposition the author supports vigorously the primitiveness of the Ranalian floral type (Polycarpicées); and from this type he proceeds to derive all the Angiosperms without exception. The Angiosperms are thus regarded as monophyletic in the strictest sense of the term—*i.e.*, they are referable to a single angiospermous ancestor. This is the weakest point of Hallier's system; for he neglects the much more probable and reasonable view that certain groups of Engler's Archichlamydeæ (*e.g.*, Amentiferæ, Centrospermæ) may be referable to ancestors which existed before the separation of Monocotyledons from Dicotyledons, or even before the advent of the present Angiosperms. Monocotyledons and Dicotyledons may, in the same way, owe their origin to distinct proangiospermous ancestors.

The purpose of arranging all the Angiosperms in one genealogical tree with a Ranalian ancestor at its root has driven the author to many forced and improbable conclusions. He persists in the one-time fashionable idea, fostered by the work of Arber and Parkin, that the Ranalian Angiosperm is directly connected with the Bennettitean Gymnosperm; it is surely time to recognise the fundamental difference between the closed carpels of *Magnolia* and the interseminal scales of *Bennettites*. The latter may represent an unsuccessful effort at angiospermy; but it has nothing essential in common with the angiospermy of our modern flowering plants.

Thirty-two reasons—some of them excellent—are given for regarding the Ranalian floral type as primitive; but the *relative* element in the primitive character is overlooked. The Amentiferæ may have also their primitive type, corresponding to their portion of the angiospermous phyletic tree; but it is incapable of comparison with the Ranalian type, which lies at the base of a group totally distinct (see *New Phytologist*, xi., 385).

Berberidaceæ are regarded by the writer as containing the most primitive floral types—relatively to *all* the Angiosperms—and these he links closely with Cycad-like Gymnosperms ("voisin des *Bennettitacées*"); from these all the Dicotyledons, and later the Monocotyledons, have descended.

We cannot but condemn the system in so far as it reflects the supposition that the Angiosperms form a closely monophyletic group, let alone that its foundation is tainted with the significance accorded to the resemblance between the flowers of *Bennettites* and *Magnolia*; but there is much to be admired in Mr. Hallier's work. The system itself is commendable in its recognition of the affinities of the various sympetalous groups with their several polypetalous ancestors, and the "agglomérat heterogène" Sympetalæ is abolished. The polyphyletic nature of this latter group is thus admitted; why, then, should not the so-called Archichlamydeæ and the Monocotyledons be polyphyletic also?

Some interesting matter—*e.g.*, a review of the theoretical morphology of the leaf (177–186) and the perianth (186–195)—is comprised in the "abrégé," but too much stress is accorded to characters which are open to the suspicion of phyletic insignificance. The importance of floral as against vegetative characters in the determination of the larger groups is not sufficiently emphasized. Above all, the *principles* underlying the system are not made clear; characters of any and every description are used promiscuously in the determination of affinities, without reference to their relative phyletic value or the reasons for it. Biology may not be so neglected as it is in this system.

It is easy to find fault with a work like the present; but we welcome it as a much-needed stimulant to the current of thought in a direction where too much is apt to be taken for granted; and it reflects throughout the close study, the considerable experience, and the keen interest of the writer.

H. F. Wernham.

Plant Diseases.

1. *Grundzüge der Allgemeinen Phytopathologie.* By Professor Dr. H. Klebahn. Berlin: Gebrüder Borntraeger. 1912. Pp. 147. 74 figs. Price 4 mk. 80 pfg.

The science of Plant Pathology which deals with conditions and organisms hurtful to plant life has received ever increasing attention in recent years. So many facts and observations concerning the causes of arrested growth or premature decay in the vegetable kingdom have been tabulated, that a stage has been reached when it seems not only possible, but highly desirable, to make a general survey—to take stock of the additions to our knowledge in this field of research. Dr. Klebahn's work on the characteristic features of Phytopathology provides us with just such a general consideration of the subject. Under "causes of disease" he enumerates chemical, physical, and climatic conditions, wounds and attacks by parasitic organisms—plant and animal. He also includes the more obscure disturbances in the metabolism of the plant, and diseases of which the origin or cause is unknown.

As Dr. Klebahn points out, it is very rarely that disease can be traced to any single one of the causes given. Usually it is the interaction of a series of adverse conditions. Poverty of the soil, for instance, may so affect the vitality of the plant that it succumbs easily to cold or drought, or falls a ready prey to parasitic attacks.

The author deals in this treatise with broad principles, leaving aside the detailed account of particular cases of disease, and he winds up with a chapter on teratology, abnormalities and variations, the origin of which is doubtful. They are not generally reckoned as diseases, but they may cause serious disfigurement. His book will be welcomed by students as a helpful and suggestive contribution to the science of Plant Diseases. It includes a bibliography of 269 citations, and a copious index, and is illustrated by figures in the text which are clear and good.

A. L. S.

2. *Plant Diseases.* By Dr. W. F. Bruck, translated by J. R. Ainsworth-Davis. Blackie & Son, Ltd. 1912. Price 2s. net. Pp. 152. Illustrated.

This attractive-looking little book is a translation of Bruck's *Pflanzen-Krankheiten* in the well-known Sammlung Göschen series. It is the best short introduction to the study of plant diseases that we know, but we should have thought that one of our own phytopathologists could have written a book of similar scope, at least equally well. On the whole, the translation seems good, but it reads like a translation. The translator has in some cases stuck too closely to the original, as, for instance (p. 40), where he says: "In heterœcious rusts it sometimes happens that the æcidium stage is omitted from the life-history," and (p. 39), where concerning the teleutospores, it is stated that "they consist of more than one cell."

The Introduction deals with methods of work and aims, followed by a summary of the classification and structure of pests, plant and animal. In the special treatment the pests are arranged according to their hosts, *e.g.* agricultural pests of cereals. The last chapter, which is concerned with the treatment of plant diseases, is particularly interesting.

The translator tells us in his Preface that his few additions are in square brackets. The largest addition concerns *Chrysophlyctis endobiotica*. The reader is informed that it is a "notifiable disease," whatever that may mean to the beginner, for whom such a book is obviously intended, and also that "the classificatory position is doubtful: Eriksson places it in the Chytridiaceæ, while others regard it as a Myxomycete." Why Eriksson is specially mentioned we do not know; we had thought that all systematists regarded *Chrysophlyctis* as a member of the Chytridiaceæ. The use of square brackets seems, however, to have been somewhat of an obsession, as they are freely indulged in where the ordinary round bracket is used in the original. The information (p. 57) that *Alternaria solani* is an Oomycete might also have been put in square brackets! In the Preface "the low price at which the English edition is issued" is mentioned; but the German edition can be obtained in this country for tenpence, and there seems little reason why the English translation of a five-years-old book should cost more than twice as much as the original.

J. R.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on 20th February, 1913, Dr. Stapf showed an abnormal fruit of *Acer Pseudo-platanus*. The specimen was found near Woodstock, Oxfordshire, on September 16th, 1912. There are seven distinct carpels, six of which have perfected seeds. The fruit is apparently composed of two parts, the larger having four carpels, each of which has perfected seeds, and the smaller three carpels, one of which is sterile, though a good wing has been produced. Transverse sections through the pedicel were compared with similar sections made through the pedicel of a normal two-winged fruit. There are slight differences in structure between the two sets of sections, but nothing to indicate so large an increase in vascular strands as might be expected if two or three flowers had fused together. O. Penzig (*Pflanzen-Teratologie*, vol. i. p. 364) makes the following statements concerning an increase in the number of carpels of the flowers and fruits of the Sycamore:—"An increase in the number of carpels in the flower is very frequent; three, four, five, and even eight carpels have been seen in one flower. The accessory carpels are often inserted somewhat higher than the normal ones, so that (in four-winged fruits) the pistil appears to be made up of two decussate pairs of carpels."

At the same meeting a paper by Mr. W. B. Hemsley was read in abstract by the Botanical Secretary, on the genera *Radamæa* Benth. and *Nesogenes* A. DC. *Radamæa montana* is a shrub from Madagascar, and some imperfect specimens of a similar plant were referred to his *R. prostrata*. On comparing these specimens with some collected on the 'Sealark' Expedition by Prof. J. Stanley Gardiner and Mr. J. C. F. Fryer, Mr. Hemsley found it had to be transferred to its proper genus, *Nesogenes*. Four species of the latter genus are now known, including a new one from Aldabra named *N. Dupontii* Hemsl., after the discoverer. The present known distribution of *Nesogenes* is peculiar, being limited to two distant areas in the southern tropic; one in the Pacific Ocean with a mean longitude of 145° W., the other in the Indian Ocean with a mean longitude of 60° E. The plants are, however, inconspicuous, and may readily be passed by without notice.

The Council of the Linnean Society have had under consideration the application of the bequest of £100 left to the Society by the late Sir Joseph Hooker. They feel that the Fellows of the Society would not desire this legacy to be applied to the ordinary purposes of the Society, but that they would wish it to be used for some memorial of the illustrious donor in connection with the Society. Such a memorial would be peculiarly appropriate, since the late Sir Joseph Hooker was for nearly seventy years one of the strongest supporters of the Society, taking the keenest interest in its work. The Council have agreed that the most suitable memorial would be an adequately endowed Sir Joseph Hooker Lecture, to be delivered every second, third, or fourth year, and to be published by the Society. They propose that the Lecture be on some subject especially associated with the name of Sir Joseph Hooker, and that the Lecturer be appointed by the Council, not necessarily from among the Fellows of the Society. They suggest that the generous bequest of £100 should form the nucleus of a Fund to be raised for the purpose of carrying this proposal into effect. The Council are gratified to know that their proposal meets with the warm approval of Lady Hooker. The Council consider that a total sum of not less than £600 should be obtained, and confidently appeal to the Fellows of the Linnean Society and others to contribute.

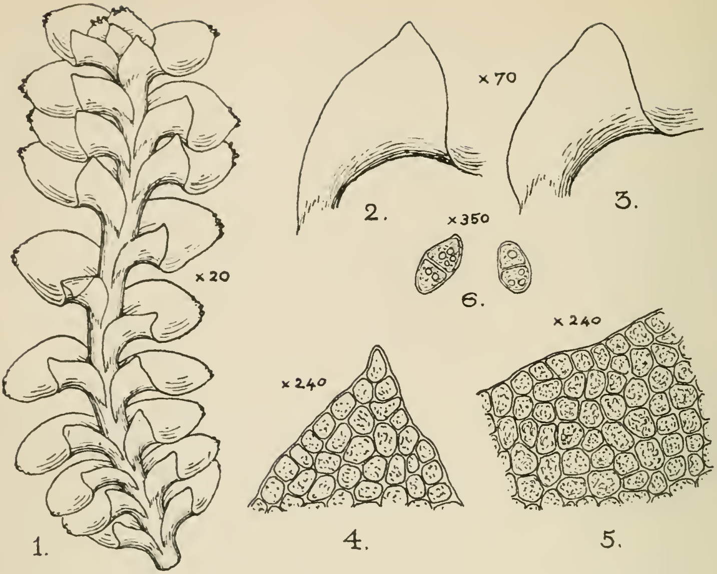
Messrs. Dent have added to their shilling series of "Temple Primers" an excellent treatise on *Plant Geography* by Mr. Boulger. In the limited space at his command, he has given us an exceedingly complete and accurate survey of the subject, showing a great amount of reading—a useful bibliography is appended—and a careful correlation of facts. It would be impossible to produce a more admirable summary, and we warmly recommend it. There is an excellent index.

The last number (February) of the *Journal of Genetics* contains no paper of exclusively botanical interest, but deals with problems which indirectly affect botanical study. The principal paper, which has an excellent coloured plate, is by Prof. Toyama, of the Imperial University of Tokyo, and deals with "Maternal Inheritance and Mendelism," as illustrated by the eggs of silkworms. Mr. Clifford Dobell writes on "Mutations in Bacteria," and Dr. Trow on "Forms of Reduplication, Primary and Secondary," illustrated by his own observations on *Senecio vulgaris* and those of Mr. Gregory on *Primula sinensis*.

The Plant Protection Section of the Selborne Society is carrying out a scheme by which it is hoped to elicit the sympathies of all the local natural history societies on the question of Plant Protection, and to appoint correspondents in as many places as possible. The Executive Committee of the Section, which was appointed at a meeting held at 42, Bloomsbury Square, on January 30th, consists of Dr. A. B. Rendle (Chairman), Professor G. S. Boulger, Professor Cavers, Mr. E. M. Holmes, Mr. C. E. Salmon, and Mr. A. R. Horwood as Recorder, together with the Executive Officers of the Council.

Under the somewhat ambiguous title *Frequency in Floral Analysis*, Mr. Woodruffe-Peacock has added to his "Rural Studies Series" a sixpenny pamphlet dealing with the methods of recording the frequency of a plant in a given district. The scheme proposed is, he tells us, "the result of eight failures and thirty years' loss of time," and is ingenious and complete. Mr. Peacock gives as an illustration his treatment of *Lamium album*, which indicates the method to be adopted in his flora of Lincolnshire, which we are glad to learn is in an advanced state. The somewhat elaborate division of the twelve pages into parts and sections gives the pamphlet a confused appearance which is increased by the typographical arrangement. It is supplied by Messrs. Goulding, of 20, Mercer Row, Louth.

Messrs. Lovell Reeve have issued as Parts x, xi, and xii a continuation of Fryer's *Potamogetons of the British Isles*, edited by Mr. A. H. Evans from the author's MSS. and from his notes published in this Journal. The existence of Morgan's excellent plates will enable the work to be brought to a conclusion, and we are glad to learn that the descriptive portion will be undertaken by Mr. Arthur Bennett, who has throughout contributed the portion relating to distribution. The mode of citation of synonyms offers some ground for criticism and discussion, but all will welcome the continuation and approaching completion of the work, which many had feared would share the fate of Mr. Hanbury's monograph of British *Hieracia*.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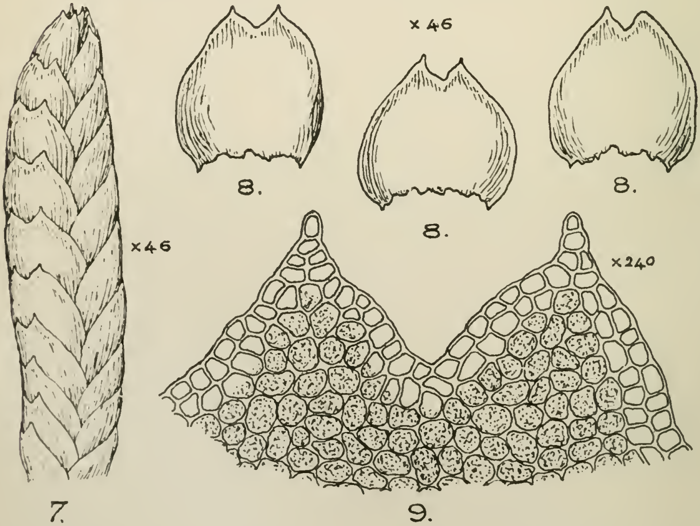
Diplophyllum gymnostomophilum *Kaal.*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Marsupella apiculata *Schiffn.*

H. G. Jameson del.

MOSSES AND HEPATICS OF SOUTH ABERDEEN.

By W. E. Nicholson.

(Plate 526.)

The following notes are the results of a holiday mostly spent with Mr. H. H. Knight at Braemar, where we botanized together from the 12th to the 24th July, 1912. Mr. Knight also spent a few days at Ballater before I joined him, and from the 24th to the 30th July I was at the Spital of Glenshee, where Mr. Peter Ewing, F.L.S., helped me in many ways to explore the surrounding country. The district does not appear to have been recently worked very closely for mosses and hepatics, and this, coupled with the fact that we found two novelties to the British list, besides the rare and recently discovered *Cephalozia Loitlesbergeri* Schffn., has induced me to think that a few notes upon what we found might be of some interest.

The rocks about Braemar are almost exclusively of granite formation with small outcrops of limestone at Creag Choinnich, Morrone Hill, and for a small area in Glen Clunie. Except on Morrone Hill, where the limestone reached to about 2500 ft. under rather unfavourable conditions, the outcrops of limestone were at low elevations. The whole of the extensive mass of Ben Muich Dhui is of siliceous rocks, and in consequence hepatics were far better represented in the district than mosses.

From Glenshee, limestone and schistose rocks reaching an elevation of over 3000 ft. at the head of Canlochan were accessible, and the flora generally, especially the phanerogamic flora, is richer.

One of the most striking features of the hepatic flora of the Braemar district was the prevalence of the genera *Gymnomitrium* and *Marsupella*, of which no fewer than sixteen of the twenty-two species recorded for Britain occurred, including the rare *M. sphacelata* and *M. sparsifolia* and the newly discovered *M. apiculata*.

Braemar is a good centre, but some of the best ground is a long way off. The summit of Lochnagar is twelve miles distant, and that of Ben Muich Dhui twenty miles, and as in both cases the route is only practicable for any kind of conveyance for about half way, an early start is necessary if any time is to be devoted to exploration of the higher ground.

Besides South Aberdeen (92) the region examined embraced small portions of Banff (94), East Perth (89), and Forfar (90).

I am indebted to Mr. Knight for many additional notes; to Mr. S. M. Macvicar for much assistance with several critical species, especially of *Scapania*; and to the Rev. H. G. Jameson for kindly drawing the excellent plate of the novelties.

In the following list the nomenclature of the mosses is that of Mr. Dixon's *Students' Handbook of British Mosses*, while that of the hepatics follows for the most part the arrangement of Mr. Macvicar's *Students' Handbook of British Hepatics* recently published.

Mosses.

Sphagnum Austini Sull. var. *imbricatum* Lindb. 92. Glen Callater, sparingly.

Andreæa nivalis Hook. var. *fuscescens* Hook. 92. Lochnagar; abundant on Ben Muich Dhui.

Catharinea tenella Röhl. 89. Moist sandy ground by a roadway near Glenshee Lodge, *c. fr.*

Oligotrichum hercynicum Lam. 92. In good fruit on Lochnagar.

Ditrichum tenuifolium (Schrad.) Lindb. 92. Stony ground by the roadside, Glen Clunie.

Seligeria Doniana (Sm.) C. M. 92. Creag Choinnich, Braemar, *c. fr.*

Brachyodus trichodes (W. & M.) Fürn. 92. Near the summit of Lochnagar, *c. fr.*

Cynodontium strumiferum (Ehrh.) De Not. 92. Glen Clunie, *c. fr.* — *C. laxirete* (Dixon) Grebe. 92. Coire Etchachan, alt. ca. 3000 ft., *c. fr.*

Dicranum fulvellum (Dicks.) Sm. 92. Ben Muich Dhui, *c. fr.* —*D. schisti* (Gümb.) Lindb. 89. Glenshee, *c. fr.*—*D. molle* Wils. 92. Near Loch Etchachan, *c. fr.*

Fissidens osmundoides (Sw.) Hedw. 92. Glen Clunie.

Grimmia incurva Schwgr. 92. Creag Cluny, near Braemar.—*G. Hartmani* Schp. 92. Loch Callater. — *G. atrata* Mielich. 92. Iron-bearing rocks above Loch Kander, *c. fr.*

Pottia latifolia (Schwg.) C. M. 89. Schistose rocks, Glen Beag, *c. fr.*, sparingly.

Zygodon lapponicus (Hedw.) B. & S. 90. Canlochan, *c. fr.*

Orthotrichum speciosum Nees. 92. Linn of Corriemulzie, on ash, *c. fr.*

Œdipodium Griffithianum (Dicks.) Schwgr. 92. Above Loch Kander, sterile, with gemmæ. 90. Canlochan, *c. fr.*

Oreas Mielichoferi Brid. 92. Iron-bearing rocks above Loch Kander with *Grimmia atrata.*

Webera annotina (L.) Schwgr. 92. Near Loch Callater, *c. fr.* —*W. Ludwigii* (Spreng.) Schp. 92. Ben Muich Dhui, abundant.

Bryum pallescens Schleich. 92. Glen Callater, *c. fr.* — *B. Mildeanum* Jur. 92. Loch Callater.

Mnium spinosum Schwgr. 90. Canlochan.

Pseudoleskea patens (Lindb.) Limpr. 90. Canlochan, *c. fr.*

Amblystegium Sprucei (Bruch) B. & S. 92. Creag Choinnich, Braemar.

Hypnum arcticum Sommerf. 92. Glen Callater.—*H. stramineum* Dicks. 92. Among dry rocks near the summit of Lochnagar; a rather remarkable, robust, long-stemmed form.

Hylocomium umbratum (Ehrh.) B. & S. 92. Coire Etchachan.

Hepatics.

Riccia sorocarpa Bisch. 89. Schistose rocks, Glen Beag, *c. fr.*

Aneura latifrons Lindb. 92. Boggy ground near Ballater and Braemar.

Metzgeria conjugata Lindb. 92. Linn of Corriemulzie.—*M. pubescens* (Schrank) Raddi. 92. Linn of Corriemulzie and Creag Choinnich.

Moerckia Blytii (Mörck) Brockm. 89. Canlochan, *c. fr.* 92. Lochnagar and Ben Muich Dhui, *c. fr.* 94. Near Loch Avon, *c. fr.*

Gymnomitrium concinnatum (Lightf.) Corda. Abundant in all the districts and not infrequently fertile, descending to about 1200 ft.—*G. obtusum* (Lindb.) Pears. Apparently rare. 89. Lower slopes of the Cairnwell. 92. Glen Clunie. — *G. adustum* Nees. 92. Rocks above Loch Kander and near the summit of Lochnagar, *c. fr.*—*G. varians* Lindb. Schffn. 92. Not infrequent on Ben Muich Dhui and Lochnagar.—*G. crassifolium* Carr. A few stems from Lochnagar seem to be referable to *crassifolium* rather than *varians.*—*G. alpinum* (Gotts.) Schff. 92. Wet rocks below the summit of Lochnagar and on Ben Muich Dhui.

Marsupella condensata (Angstr.) Kaal. 92. Ben Muich Dhui, at alt. ca. 3700 ft., sparingly. —*M. apiculata* Schffn. (Plate 526, figs. 7–9.) 92. Ben Muich Dhui, sparingly, with the last. For further notes on this species, *vide* Journ. Bot. 1912, 367.—*M. Stableri* Spr. 92. Moist rocks and soil near the summit of Lochnagar and Ben Muich Dhui, rather frequent. When growing on moist soil the plant is often more compact, with shorter, suberect stems.—*M. sparsifolia* (Lindb.) Dum. 92. Moist ground a little below the summit of Lochnagar, alt. ca. 3500 ft., near a spot where *M. sphacelata* was growing submerged in a stream, *c. fr.* I took it indeed for a starved form of *sphacelata* in the field. The locality is probably the original one in which the plant was discovered by the Messrs. Sim. — *M. ustulata* Spr. 92. Rocks above Loch Callater and near the Linn of Muich, near Ballater, *c. fr.* — *M. Funckii* (W. & M.) Dum. 92. Wall by the roadside near Braemar, sparingly.—*M. emarginata* (Ehrh.) Dum. A small blackish form occurred on rocks above Loch Kander, associated with *Oreas Mielichoferi* and *Grimmia atrata.* A reddish form showing some approach to *M. Pearsoni* occurred on Creag Choinnich.—*M. aquatica* (Lindenb.) Schffn. 92. Coire Etchachan and on wet rocks above Loch Etchachan.—*M. sphacelata* (Gies.) Lindb. 92. Submerged in a small stream on Lochnagar, alt. ca. 3500 ft., not infrequent where it occurred and fruiting very sparingly, also on Ben Muich Dhui. 94. Streams above Loch Avon. — *M. Sullivantii* (De Not) Evans. 92. Moist stony ground on Creag an Loch above Loch Callater and on Lochnagar.

Alicularia compressa (Hook.) Nees. 92. Abundant on Ben Muich Dhui up to about 3500 ft. Huge swollen tufts occurred near the top of Coire Etchachan. — *A. Geoscyphus* De Not. 92. Near the head of Glen Callater, sparingly, *c. fr.*—*A. Breidleri* Limpr. 92. Near the summit of Lochnagar and on Ben Muich Dhui, not infrequent anywhere over 3500 ft. elevation.

Eucalyx obovatus (Nees) Breidl. 92. Not uncommon near Braemar, *c. fr.* A very minute bright red form occurred on rocks by the road to Inverey.—*E. paroicus* (Schiffn.) Macv. 92. Rocks by a stream close to Braemar, *c. per.*

Haplozia sphærocarpa (Hook.) Dum. 90. By a stream on Canlochan in rather large tufts, *c. per.*—*H. cordifolia* (Hook.) Dum. 92. Glen Quoich and Glen Derry; not infrequent.—*H. riparia* (Tayl.) Dum. 92. Rocks by a little burn from Morrone Hill; sparingly and mixed with the next species, *c. per.*—*H. pumila* (With.) Dum. 92. With the last, *c. per.*—Var. *rivularis* Schffn. 92. Submerged in a stream route to Lochnagar, alt. ca. 3000 ft., *c. per.*, sparingly.—*H. Schiffneri* Loitlesb. 89. Schistose rocks, Glen Beag, very sparingly, *c. per.* Mr. Macvicar states that the leaves are rather broader than in Dr. Fergusson's original gathering from this locality. The whole plant is a little larger than the forms which I have seen from high altitudes on the Continent.

Anastrophyllum Donianum (Hook.) Steph. 92 and 94. Among boulders on the rough stony ground between Loch Etchachan and Loch Avon at an altitude of a little over 3000 ft.

Gymnocolea inflata (Huds.) Dum. 92. A small blackish form, often scarcely larger than a *Cephaloziella* occurred on iron-bearing rocks above Loch Kander, associated with *Grimmia atrata*, &c., var. *heterostipa* (Carr & Spr.) K. Müll. 92. Moist rocks, Creag Choinnich. A small tuft of the variety was found on Ben Muich Dhui near the ruins of the hut erected by the Ordnance Survey not far from the summit, and well above the 4000 ft. line.

Lophozia badensis (Gotts.). 89. Schistose rocks, Glen Beag, *c. per.*, sparingly. In this plant the trigones are well marked and the whole plant is highly aromatic, far more so than the Sussex plant which is not noticeably aromatic.—*L. Muelleri* (Nees) Dum. 92. Creag Choinnich and rocks at the Linn of Corriemulzie.—*L. heterocolpa* (Thed.) Howe. 92. Creag Choinnich, sparingly.—*L. longidens* (Lindb.) Macoun. 92. Rocks and rotten stumps widely distributed near Braemar.—*L. alpestris* (Schleich.) Evans. 92. Lochnagar and Ben Muich Dhui, where it nearly reaches the summit.—*L. Wenzelii* (Nees) Steph. 92. Cairn Taggart, with *Harpanthus Flotowianus*. 89. Slopes of Glas Maoll, at an elevation of about 2800 ft.—*L. bicrenata* (Schmid.) Dum. 92. Morrone Hill, Braemar, *c. per.*—*L. incisa* (Schrad.) Dum. 92. Lochnagar and Ben Muich Dhui, where it ascended to at least 3750 ft.—*L. Hatcheri* (Evans) Steph. 89. Walls by the roadside near the Post Office, Glenshee. 92. Rather common about Braemar, often with *L. longidens*.

Sphenolobus minutus (Crantz) Steph. 92. Common near Braemar, *c. per.*—*S. ovatus* (Dicks.) Schffn. 92. Near Ballater and Braemar, not uncommon, *c. per.*—*S. Hellerianus* (Nees) Steph. 92. Decaying logs, Glen Quoich, sparingly.—*S. politus* (Nees) Steph. 92. By a stream near the head of Glen Callater with the small darker form, var. *medalpadicus* Arn., which seems, however, to be little more than a state of the type directly induced by the drier ground upon which it grows.

Anastrepta orcadensis (Hook.) Schffn. 92. Among rocks between Loch Etchachan and Loch Avon, sparingly.

Harpanthus Flotowianus Nees. 92. Cairn Taggart and Glen Clunie, descending to about 2000 ft. in the latter locality.

Cephalozia bicuspidata (L.) Dum. 92. Some very puzzling forms, blackish or rosy coloured, with closely imbricated leaves, occurred on Lochnagar and Ben Muich Dhui, which I was inclined in the field to refer to *C. ambigua* Massal., but the lobes are generally more pointed and the leaf-cells larger than in authentic specimens of that species. The plants are perhaps best referred to alpine forms of the var. *conferta* Hüben., though it is probably not always easy to distinguish between certain forms of the variety and *C. ambigua.* — *C. pleniceps* (Aust.) Lindb. 92. Morrone Hill, *c. fr.* 94. Moist ground by a streamlet above Loch Avon, *c. fr.* — Var. *macrantha* (Kaal. & Nicholson) K. Müll. 92. Marshy ground among *Sphagnum*, Glen Callater, *c. per.* Further research with the Sussex plant proves it to be clearly monoicous, and I am inclined to agree with Dr. Müller in referring it to a variety of *C. pleniceps.*—*C. Loitlesbergeri* Schffn. 92. Among *Sphagnum* on the banks of the Lui Water not far from its junction with the Dee, *c. per.* (H. H. Knight). A slight doubt attached to the plant from Cockerham Moss, as the bracts and perianth were not mature. The present plant has both fully developed bracts and perianths, and agrees well with authentic material from the Continent.—*C. macrostachya* Kaal. 89. *Sphagnum* bog near Glenshee Lodge.—*C. leucantha* Spr. 92. Morrone Hill, *c. per.*—*C. Francisci* (Hook.) Dum. 90. Peaty ground below Glas Maoll. 92. Glen Quoich.

Nowellia curvifolia (Dicks.) Mitt. 89. Glenshee, *c. per.* 92. Not uncommon about Braemar, *c. fr.*

Cephaloziella byssacea (Roth) Warnst. 92. A rather remarkable plant occurred on wet grassy ground near Loch Etchachan with long rather acutely-pointed lobes, frequently toothed at the base. I was inclined to refer it to a form of *C. grimsulana* Jack, but this has obtuse lobes, and Mr. Macvicar and Herr Kaalaas agree in referring it to the present species. Somewhat papillose forms occurred near Ballater and in Glenshee, but they are not sufficiently marked for the var. *asperifolia* (Jens.) Macv.—*C. rubella* (Nees) Warnst. forma *subsimplex* Lindb. 92. A very minute, deep red plant, hardly larger than *Prionolobus striatulus*, with the bracts rather highly connate, occurred on *Sphagnum* in Glen Callater and on Cairn Taggart, *c. per.* After reading Dr. Müller's illuminating treatment of this perplexing genus, I am inclined to refer the plant to this form.

Prionolobus striatulus Jens., Schffn. 92. Rare, but apparently widely distributed, Cairn Taggart: Glen Callater: Glen Quoich, *c. per.* Only a few stems were found in each locality.

Hygrobiella laxifolia (Hook.) Spr. 89. Canlochan. 92. Morrone Hill and Glen Callater, sparingly.

Pleuroclada albescens (Hook.) Spr. 92. Lochnagar and Ben Muich Dhui.

Bazzania tricrenata (Wahl.) Pears. 92 and 94. Sparingly scattered over the district between Loch Etchachan and Loch Avon.

Chandonanthus setiformis (Ehrh.) Lindb. 89. Rocks near the Post Office, Glenshee, sparingly with the var. *alpinus*. — Var. *alpinus* (Hook.) Kaal. 92. Creag Choinnich, sparingly; Morrone Hill and Cairn Taggart, fairly common.—Var. *nemoides* Kaal. 92. Rocks above Kander, sparingly, but well-marked. A form closely approaching this variety also occurred in Glen Beag near the Cairnwell, but it is perhaps better referred to a depauperate form of the var. *alpinus*, though there is no sharp line of demarcation between the two varieties.

Diplophyllum taxifolium (Wahl.) Dum. 90. Canlochan. 92. Ben Muich Dhui among rocks at about 3700 ft., well characterized. —*D. obtusifolium* (Hook.) Dum. 89. Moist micaceous earth, Glen Beag, *c. per.*

Diplophyllum gymnostomophilum Kaal. in Beitrage zur Lebermoosflora Norwegens von B. Kaalaas, Christiania, 1898, p. 4. *Scapania gymnostomophila* Kaal. in Bot. Notiser, 1896, p. 21. (Plate 526, figs. 1–6.) Dioicous, male and female plants in separate tufts, in growth and appearance very like a small *Scapania*, growing scattered or in small tufts between mosses or creeping over them, most often over tufts of *Gymnostomum rupestre* and *G. curvirostre*, rarely in small flat growths directly on the ground, dark green, colourless below to 2 cm. long and to 2 mm. broad with the leaves. Stem simple, rarely branched, brown, in the younger parts yellowish, creeping with erect apices, comparatively thick and rigid, very brittle when dry, sinuose, thickly clothed with long hyaline root-hairs on the under side; transverse section oval, rather more strongly arched on the ventral side, antico-postical diameter 0·42 mm. diameter in breadth 0·25 mm.; cortical cells in 2–3 layers, strongly thickened and brownish, about 14 μ, the rest thin-walled to 20 μ. Leaves in two rows, approximate or touching one another, rarely overlapping, of equal size throughout, squarrose or slightly decurved, occasionally slightly antically secund, strongly arched on the back when dry, so that the plants are convex on the under side, rather thick and rigid, semi-amplexicaul, divided to $\frac{1}{2}$ to $\frac{2}{3}$ into two unequal conduplicate lobes; commissure curved or nearly straight; postical lobes obliquely oval to elongate-reniform with strongly rounded lower margin, scarcely decurrent, obtuse or more or less pointed and erose where gemmæ have been formed; antical lobes only one-third to one-fifth as large, reaching to about the middle of the stem, obliquely oval to ovate-lanceolate, acute, rarely obtuse, rarely with the apex recurved; margins of both lobes entire. Leaf-cells obscure and opaque, irregularly 4- to 6-sided, often arranged in distinct longitudinal rows, of about equal size, 17–23 μ, closely packed with chlorophyll and oil-bodies, cells on the lower margin of the postical lobes in 1–7 rows, empty and transparent; marginal cells smaller, quadratic 12 μ; cell-walls moderately thickened all round. Cuticle smooth or slightly papillose. Perianth terminal or apparently lateral owing to subsequent branching of the stem, obovate, finally clavate, to 2·5 mm. long, almost round in transverse section or a little compressed antically, plicate in the upper part with a contracted, oblique, finely toothed mouth, of a single layer of cells throughout; archegonia to 10; perichætial leaves like the stem-leaves, but a little larger. Fruit unknown. Male plants weaker, bearing antheridia in the middle and towards the apex of the stems, perigonial leaves, similar to the stem-leaves, but slightly saccate at the base; antheridia solitary, greenish-yellow, oval to spherical (224 and 166 μ) on stalks of a single series of cells a quarter to half as long. Gemmæ common, in large masses on the apices of the upper leaves, greenish when young, reddish-brown later, elliptical to oval, 18–25 μ, generally two- rarely one-celled.

89. Earth among schistose rocks, Glen Beag, very sparingly, *st.*

The above diagnosis is largely borrowed, and that of the perianth wholly taken, from the description by Herr Kaalaas (*loc. cit.*). The Scotch plant was found growing directly upon the ground and not among mosses; the stems are shorter and greener and the antical lobes of the leaves are generally a little larger than in a Scandinavian specimen kindly sent to me by Herr Kaalaas, but there can be no doubt as to the identity of the Scotch plant which was first suggested by Mr. Macvicar, and has since been fully confirmed by Herr Kaalaas himself. Though rare, it appears to have a fairly wide distribution in Norway from the sea-level to the Alpine region, and it has also been found by Dr. Douin near Gavarnie in the Pyrenees. The plant is of interest as standing on the confines of several genera, or rather as showing the doubtful limits which some genera possess. I was inclined to refer it when gathered to *Scapania*, to which, indeed, it was assigned by Herr Kaalaas until the discovery of the perianth, and Dr. V. Schiffner has shown (*Bryologische Fragmente*, xlix. p. 2) that the plant may with equal, if not greater, reason be assigned to *Sphenolobus*. It is rather closely related to *S. ovatus*, and should perhaps be consistently placed in the same genus. It may readily be distinguished from this species by the more rounded commissure, the less acutely-pointed lobes, and the apparently constant presence of gemmæ.

Scapania compacta (Roth) Dum. 92. Craigandarroch, near Ballater; Glen Clunie.—*S. subalpina* (Nees) Dum. 92. Glen Quoich and elsewhere, fairly common. A rather flaccid form with conspicuous orange-red gemmæ occurred on rocks above Loch Etchachan.—*S. æquiloba* (Schwgr.) Dum. 90. Canlochan.—*S. aspera* Bernet. 92. Morrone Hill, Braemar.—*S. nimbosa* Tayl. 92 and 94. Sparingly among boulders between Lochs Etchachan and Avon at an altitude of not less than 3000 ft.—*S. ornithopodioides* (With.) Pears. 92 and 94. Sparingly with the last species and *Anastrophyllum Donianum.*—*S. dentata* Dum. 92. Rather common and variable on the high ground.—*S. intermedia* (Husn.) Pears. 92. Moist decaying log, Linn of Corriemulzie, well characterized.—*S. undulata* (L.) Dum. 92. A rather puzzling series of reddish forms occurred on Lochnagar and Ben Muich

Dhui.—*S. obliqua* (Arn.) Schffn. 92. Apparently not uncommon on Lochnagar and Ben Muich Dhui. This plant, which seems to be one of the most distinct of the recently distinguished species of *Scapania*, is generally recognizable at a considerable distance by its brownish colour and the swollen tufts which rise conspicuously above the level of the other plants growing round the spring heads which it often affects. — *S. paludosa* K. Müll. var. *vogesiaca* K. Müll. 90. Canlochan, rare. 92. By a spring on Lochnagar, alt. ca. 3500 ft., a tall red-stemmed plant with the marginal cells of the leaves not so strongly thickened as in the Canlochan plant, but otherwise well characterized.—*S. rosacea* (Corda) Dum. 89. Near the head of Canlochan, sparingly.—*S. umbrosa* (Schrad) Dum. 92. Common on logs near Braemar.

Radula Lindbergii Gotts. var. *germana* Jack. 90. Canlochan.

Madotheca rivularis Nees. 92. Linn of Corriemulzie.

Cololejeunea calcarea (Lib.) Schffn. 92. Limestone rocks, Creag Choinnich, not uncommon.

Frullania fragilifolia Tayl. 92. Rocks, Craigandarroch, near Ballater; trees, Creag Choinnich, sparingly.

Explanation of Plate 526.—Figs. 1–6, *Diplophyllum gymnostomophilum* Kaal. 1, stem with leaves; 2, 3, antical lobes; 4, leaf-cells of antical lobe; 5, leaf-cells of postical lobe; 6, gemmæ (Glen Beag). Figs. 7–9, *Marsupella apiculata* Schiffn. 7, portion of stem; 8, leaves; 9, areolation of upper part of leaf (Ben Muich Dhui).

NOTES ON THE MYCETOZOA OF LINNÆUS.

By G. Lister, F.L.S.

The International Botanical Congress, which met in Brussels in 1910, decided that the publication by Linné of the *Species Plantarum* in 1753 should be taken as a starting-point for the earliest generic and specific names of the Mycetozoa. In this book the binomial system of nomenclature is employed throughout for the first time; and, although as regards Fungi the work shows less grasp of the subject than that of some of Linné's predecessors, the fact of its publication gave an impetus to botanical study which soon led to a fuller recognition of Fungi, and with them of the Mycetozoa.

In the following notes reference is made first to the species of Mycetozoa described in *Species Plantarum*, and afterwards to the specimens preserved in the Linnean herbarium in the rooms of the Linnean Society at Burlington House.

While examining the specimens I had the invaluable assistance of Dr. B. Daydon Jackson, Secretary of the Linnean Society, whose knowledge of the correspondence of Linné enabled him in many cases to identify the handwriting of the notes on the sheets on which the specimens are mounted.

In the second edition of *Species Plantarum*, published in 1762–3, six or possibly seven species of Mycetozoa are described under the fungus genera *Clathrus*, *Lycoperdon*, and *Mucor*. Although Linné's own descriptions here quoted are usually very short, they are in most cases accompanied by references to descriptions and illustrations of previous authors which permit the species to be identified.

The species are *Clathrus denudatus*, *C. nudus*, *C. recutitus*, *Lycoperdon radiatum*, *L. epidendrum*, *Mucor septicus*, and *M. Embolus*.

"CLATHRUS DENUDATUS. C. stipitatus, capitulo oblongo valvato. *C. pediculatus purpureus capite oblongo* Guett. Stamp. p. 17. *Clathroides purpureum pediculo donatum* Mich. Gen. p. 214, t. 94, fig. 1. Habitat in Europa australiori." The reference to Micheli's description and illustration makes it clear that this is the species now called *Arcyria denudata* Sheldon (syn. *A. punicea* Persoon).

"CLATHRUS NUDUS. C. stipitatus, capitulo oblongo axi longitudinale adnato. Fl. Suec. n. 1264. *Clathroidastrum* Mich. Gen. p. 214. Habitat in Italiæ lignis putridis." This brief description, and the diagrammatic figures of *Clathroidastrum* in Micheli's Nov. Plant. Gen. tab. 94, may apply to almost any species of the genus *Stemonitis*. Rostafinski follows Fries in giving *Clathrus nudus* as a synonym for *Stemonitis fusca* Roth.

"CLATHRUS RECUTITUS. C. stipitatus capitulo globoso, glande ovali. Fl. Suec. n. 1264. Habitat in Suecicæ truncis arborum." In the thirteenth edition of Linné's *Systema Naturæ*, edited by G. F. Gmelin (1791), this species is placed in the genus *Stemonitis*, with the following description:—"Stemonitis albida filis ovatis, stipite brevi." On the strength apparently of Gmelin's definition Fries gives *Clathrus recutitus* as a synonym for *Arcyria cinerea* (Bull.) Pers. (Syst. Myc. iii. 180).

"LYCOPERDON RADIATUM. L. disco hemispherico, radiato, colorato. Habitat in Suecicæ lignis Abietinis putridis, ad prædium nostrum Sæfja, ubi lectus 1760 a Filio. Magnitudine dimidii fructus Coriandri. Discus subglobosus, fuscus, elastice dehiscens, expellensque cum avolante polline lanam bombycinum, tumescentem, fuscum, rariorem adhærentem. Limbus campaniformis, niveus, sectus fere ad basin in partes 12 æquales, disco paulo longiores, basi integri ovali cingente discum." There is evidence to prove that the type here referred to is in the Linnean Herbarium (see below). The species is *Diderma radiatum* Lister.

"LYCOPERDON EPIDENDRUM. L. cortice farinaque purpurea. Fl. Suec. n. 1114. *L. epidendron miniatum pulverem fundens* Buxb. Hal. p. 203. *L. sanguineum sphæricum* 1 Buxb. cent. 5, p. 15, t. 29, f. 2. Habitat in Lignis parietis antiquis." This species is undoubtedly *Lycogala epidendrum* Fries.

"MUCOR SEPTICUS. M. unctuosus flavus. Fl. Suec. n. 1117; 1285. *Mucilago flava ramosissima mollis* Hall. helv. 5. *Spongia fugax mollis flava amœna* March. Act. 1727, p. 472. Habitat in vaporariis deservientibus visibili incremento, maturus semina

explodens." There is no doubt that this refers to *Fuligo septica* J. F. Gmelin. The reference to Jean Marchant's article quoted above is insufficient, and not quite correct. The full title of the article, in which the general appearance and growth of this species is graphically described, is as follows:—"Touchant une Végétation particulière qui nait sur l'Écorce du Chêne battue et mise en poudre, vulgairement appellée du Tan," published in *Hist. & Mém. de l'Academie Royale des Sciences*, p. 335, tab. 14, fig. 1, 2; read Dec. 1727; published 1729. A short abstract of this paper is given on pp. 40, 41 of the same volume.

"MUCOR EMBOLUS. M. seta nigra, villo fusco. *Embolus seta nigra villo fusco*, Fl. Suec. n. 1138, 1288. *Embolus nigerrimus villo albo adspersus*. Hall. helv. 8, t. 1, fig. 1." This is given by Fries as a synonyn for *Stemonitis ovata* Persoon, a species now known as *Comatricha nigra* (Pers.) Schroeter, but it would seem that the description and Haller's illustration might apply equally well to *Comatricha typhoides* (Bull.) Rost. or to several species of *Stemonitis* (see note on specimen marked "*Embolus*" below). It is not surprising that the earlier authors failed to distinguish these species, for their characters can only be completely recognized with the aid of microscopic appliances unknown in their day.

In the Linnean Herbarium the following species are represented.

Within the cover marked "Clathrus" are four specimens of *Stemonitis*, each fastened down on a separate sheet.

With Dr. Jackson's permission I took a little of the spore-dust and some minute fragments of broken capillitium that were lying loose on the sheets, and examined them under the microscope. Fortunately in this genus the size and markings of the spores usually afford characters by which the species can be recognized.

On the first sheet is a specimen of *Stemonitis ferruginea* Ehrenb. The long-stalked sporangia form a fair-sized tuft, and measure 11 mm. in total height. The fragment of capillitium examined shows a close surface-net of rather stout threads, attached to the columella by few strong branches; the pale reddish spores are 4 to 5 μ diam. The sheet is marked in Linné's hand "Clathrus 3 nudus"; the numeral 3 refers to *C. nudus* being the third species described by him in the genus.

The specimen on the second sheet is also *Stemonitis ferruginea* Ehrenb. The sporangia are similar to those on the first sheet, except that the spores are rather larger and average 5 μ diam. The sheet is headed "Clathrus Linn. spec. 3, p. 1179" in the handwriting of Professor Johan Leche. At the foot of the paper Sir J. E. Smith * has written "*nudus*" in pencil; below this, again, is written in a neat foreign hand:—"In parœcia Ulfsby, Biörneburgo adjacente lectus a Frid. Reinh. Brander in Betulis putridis." Björneborg is in the province Abo-Björneborg, S.W. Finland. Brader is referred to by Linné as "Magister," probably of Abo University. He may have been a friend of Leche's. The latter (born 1704, died 1764) was Professor of Anatomy and Medicine at Abo University; several sheets from his collection appear in the Linnean Herbarium.

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* Sir James Edward Smith, the British botanist (1759–1828), purchased the Linnean Herbarium in 1784 from the widow of Linné. He was the first President of the Linnean Society, founded 1788.

On the third sheet is a fine specimen of typical *Stemonitis splendens* Rost. The total height of the sporangia is 14 mm.; the capillitium has a firm surface-net, with rounded meshes 20 to 30 μ diam., attached to the columella by few strong branches. On the sheet is written in pencil "Clathrus nudus," followed by an abbreviation that looks like "Angl." Dr. Jackson thinks the handwriting is that of the Swede, Jonas Dryander, a distinguished pupil of Linné, and that the note was probably made when he and Sir J. E. Smith went over the Linnean Herbarium together in 1784–5. It seems unlikely that the doubtful word "Angl" indicates that the specimen came from England, since *Stemonitis splendens* apparently requires a warmer climate than ours for its perfect development; the typical form has not been recorded from England, and is rare in Europe; but is abundant in the United States and in the tropics.

On the fourth sheet is a weathered specimen of *Stemonitis fusca* Roth., the spores of which, when highly magnified, show characteristic spinulose reticulation, and measure 7 μ. At the head of the sheet Linné has written "*Embolus*"; at the base the word "*lichenoides*" is written in a handwriting which resembles that of the great Swiss botanist, Albrecht von Haller, although Dr. Jackson feels that he could not assert that the writing is Haller's.* It seems probable that this specimen is the type of *Mucor Embolus* L., the description of which has been quoted above.

Within the cover marked "Lycoperdon" are three specimens of Mycetozoa, representing the species *Diderma radiatum* Lister, *Lycogala epidendrum* (Linn.) Fries, and *Trichia Botrytis* Persoon.

The specimen of *Diderma radiatum* consists of about eighteen sporangia loosely clustered on five slips of wood. They are either sessile or on short stout brownish stalks; the sporangium-walls have split into five to ten widely-spreading lobes, pale brown or fawn-coloured on the outside, white within; from every sporangium the capillitium and spores are dispersed, leaving exposed the hemispherical fawn-coloured columella. The sheet is marked, in a handwriting which Dr. Jackson does not recognize, "*Lycoperdon radiatum* L., Sp. Pl. ed. ii. vol. ii. p. 1657, n. 7"; below this Rostafinski has written his name. Although Linné has not actually named this specimen, there can hardly be a doubt that it is the type of *Lycoperdon radiatum*, for, close to one of the slips of wood, he has written in a very small hand the word "*filii*," from which we infer that this is the gathering made by his son near their farm at Saefja, described in Spec. Plant. ed. 2, p. 1654 (see description of *L. radiatum* quoted above).

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* *Mucor lichenoides* L. is a lichen, *Calicium quercinum* Pers. var. *lenticulare* Nyl.

The specimen of *Lycogala epidendrum* consists of a cluster of three æthalia on a slip of wood. They measure from 6 to 8 mm. diam., and are brownish-purple in colour. The sheet is marked "*Lycoperdon epidendrum*" in the handwriting of Rostafinski, who signed his name below. It is very possible that this may be Linné's type, but we have no proof that it is so.

The specimen of *Trichia Botrytis* is probably the variety *lateritia*. On a piece of wood are several small clusters of nearly black sporangia, with long, closely adhering, dark stalks; the spores are warm buff in colour. The sheet on which the specimen is mounted is marked "*Lycoperdon* English *nigrum* Lightfoot," in a handwriting as yet unrecognized. The Rev. John Lightfoot (1735–1788) made a journey to Scotland in 1772 with Thomas Pennant, the antiquary and naturalist, and afterwards published a *Flora Scotica*. *Lycoperdon nigrum* Lightfoot (Fl. Scotica, 1069) is referred by Fries to the fungus *Sphæria spermoides* G. F. Hoffm. (Syst. Myc. ii. p. 460, and iii. Index p. 112).

PLANTS OF THE DALWHINNIE DISTRICT, JULY, 1911.

By Rev. E. S. Marshall, M.A., F.L.S., & W. A. Shoolbred, F.L.S.

To a traveller on the Highland Railway this neighbourhood appears very bleak and barren; we found it so, upon the whole, as the rocks are mostly archæan gneiss, hard, intractable, and not affording much foothold for alpine species, though one or two of the combes are fairly productive. The exceptionally dry, hot season was also unfavourable to collecting. On our only ascent of Ben Alder time did not allow us to work the magnificent eastern corrie, one of the chief haunts of the golden eagle. Hieracia are numerous and interesting; unfortunately a selection was sent to our friend Rev. E. F. Linton just too late for him to examine them, as he was fully occupied with a revision of the British Salices, and he has not yet been able to send us a report. It seems best to give an account of those which we could determine with some confidence, leaving a few over. Two of the more prevalent and characteristic have been recently described (pp. 119, 121) as new species (*H. Isabellæ* and *H. Shoolbredii*).

A few gatherings were made in 88 and 89, v.-c. Mid and East Perth (*Bryanthus cœruleus* Dippel has not decreased since 1888 on the Sow of Atholl, and should occur on some of the Badenoch hills; but its early flowering season, and the superficial resemblance of its foliage to *Empetrum*, make detection difficult). The rest came from v.-c. 96, East Inverness. Supposed new records are starred.

Ranunculus repens L. var. **prostratus* Gaud. 96. Wet, gravelly margin of the Allt Cuaich, at 1200 ft.; a small, neat plant, with decumbent, rooting stems, finely divided leaves, and few, solitary flowers, which Mr. G. C. Druce considers to be rightly named. It agrees very well with the description of *R. reptabundus* Jord. in Rouy & Foucaud, Fl. de France, i. 100; they regard this as a subspecies, citing as synonyms *R. repens* var. *prostratus* Gaud. and var. *subacaulis* Bréb.

Hieracium anglicum Fr. 96. Apparently very uncommon; it was only observed at over 2000 ft. on Creag Dubh, east of Loch Ericht, both as var. **acutifolium* Backh. and var. *amplexicaule* Backh. (*cerinthiforme* Backh.), the latter not quite so well marked. [*H. iricum* was not seen.]—*H. eximium* Backh. 96. Very scarce in Coire Chuirn, at 2500 ft., associated with *H. gracilentum* Backh. var. *graniticolum* (W. R. Linton), which grew more plentifully on another set of rocks not far away, and was again seen above a waterfall at the head of Coire Chais, a few miles farther east in the same range, just out of reach. This second plant was gathered for *H. globosum* Backh.; but its foliage and strongly pilose-tipped ligules accord much better with monocephalous examples of *graniticolum*, though the soil is not granite but mica-schist.—*H. lingulatum* Backh. 96. The form with yellow styles grows by the Allt a' Choire Chais, and on cliffs above Loch Dubh, six miles north of Cluny Castle.—*H. chrysanthum* Backh. var. *microcephalum* Backh. 96. Stream sides, at 2000 ft., below Bealach Breabag, at the south end of Ben Alder. Nearer the variety than the type, though yellow-styled; just like a form found on the slopes of Lochnagar, descending to the Dhu Loch, which was placed here by Rev. W. R. Linton.—**H. Leyi* F. J. Hanb. 96. At 2000 to 2200 ft. by the Allt a' Choire Chais and the Allt Coire Chuirn; the usual form of Scotland, diverging a little from the Welsh type by its pure yellow styles, glabrous-tipped ligules, &c.—*H. argenteum* Fr. 88. Rocks on the west side of the Sow of Atholl. 96. Streams on the west side of Ben Alder.—*H. Sommerfeltii* Lindeb. *96. Allt a' Choire Chais, at and above 2000 ft.; a form differing from the type (of which it has the foliage) and our named varieties in the heads, which are less pilose and floccose, but much blacker, with more numerous and longer glandular setæ. The same form occurs at about 2700 ft. at the head of Cama Choire, in Atholl Forest, 89, just over the "divide."—*H. Pictorum* Linton. 96. This name was suggested by Rev. E. F. Linton for a plant from cliffs above Lochan Dubh, in the *Botanical Exchange Club Report* for 1911, though the specimens submitted to him were in poor condition; and we believe that this is correct.—*H. rotundatum* Kit. *96. Evidently frequent in Badenoch, though always met with sparingly; as a rule it grew by rocky streamlets, from 1800 to 2500 ft. Below Coire Chomlain, Ben Alder; Allt Coire Chuirn; Allt Beal an Sporain; Allt Coire Bhathaich; Allt a' Choire Chais. We found one specimen high up the Allt Coire Luidhearnaidh, west of Dalnaspidal, *88.—*H. euprepes* F. J. Handb. 96. Very rare; Allt Coire Chuirn, above 2000 ft. A few plants, which we consider to be var. **glabratum* Linton, were obtained by the Allt an Lochain Dhuibh, at about 1800 ft.—*H. corymbosum* Fr. var. **salicifolium* Lindeb. 96. By the Spey, between Newtonmore and Kingussie; a *yellow*-styled form, which must be placed here, the leaves being subentire and floccose. It grew with *H. auratum* Fr. and the stylose form of *H. strictum* Fr. var. *opsianthum* Dahlst.

**Taraxacum spectabile* Dahlst. 96. Frequent by alpine rills, &c.; usually the leaves are *faintly* blotched, much less so than in Mr. Beeby's var. *maculiferum* Dahlst. from Shetland. It is an early-flowering species, and we only saw it in fruit.

Rhinanthus stenophyllus Schur. 96. Fine and abundant in grassy places near the Calder River, Newtonmore. A small plant, locally abundant at Dalwhinnie, which we referred to *R. monticola* Druce, is considered by Mr. C. E. Salmon to be *R. stenophyllus*; they are very nearly allied, but it looked different from a few specimens of the latter found close by.—*R. borealis* Druce. 96. Cliffs above Loch Dubh. The largest example that we gathered is fully a foot high, which is quite exceptional.

Chenopodium Bonus-Henricus L. 96. One very fine plant by a ditch near the bridge over the Calder, Newtonmore; doubtless a relic of former cultivation, as there is a farmhouse close by.

Rumex crispus × *obtusifolius*, *R. crispus* × *longifolius* (*propinquus* Areschoug), *R. longifolius* × *obtusifolius* (*conspersus* Hartman). 96. Dalwhinnie, where these three species grew together plentifully. Though they were collected at the end of July, the fruit-characters of our specimens are not yet fully developed; but we cannot doubt their correctness, as a careful comparison was made. Dr. C. E. Moss has pointed out to us that *R. longifolius* DC. is an earlier name than *R. domesticus* Hartm.

Betula pubescens Ehrh. var. **microphylla* (*parvifolia* Regel). 96. Very fine and characteristic in a natural birch wood at 800 ft., about a mile south of Laggan Bridge, by the road to Dalwhinnie.—Var. **sudetica* (*B. carpatica β. sudetica* Reichb. *Icones*, 3564–5!). Allt an t' Sluie, at 1500–1600 ft.; here also occurs a third form, which is near var. *microphylla*, but agrees better with the description in DC. *Prodromus*, xvi. part 2, p. 168 (1868), of *B. alba*, subsp. vii. *pubescens δ. Friesii* Regel. It is there given as occurring in Sweden, the Ural region, Bohemia, Germany, Switzerland, Scotland, and Iceland, chiefly in hilly or subalpine places, and is said to be the *B. glutinosa*, forma prima, of Fries, Summa Veg. Scand. (1849), p. 556, the *B. glutinosa* (and its forma *fruticosa*) of the Summa, p. 212 (1846), as well as of his *Herbarium Normale*. Pending further enquiry, this identification is, of course, merely tentative.—*B. nana* L. 96. We only found the dwarf birch in one locality, by the Allt an t' Sluie and its tributary the Uisge Geal, from 1600 to 2200 ft. Several bushes were unusually large, and fruited freely. No hybrid with *B. pubescens* rewarded a fairly careful search.

Salix myrsinites L. 96. Coire Chuirn, in two stations, at about 2500 ft., with the prostrate habit and foliage of the form (or variety) *S. procumbens* Forbes. The bushes were mostly without catkins, and presumably male, but the few pieces collected in fruit are remarkable. Mr. Linton wrote as follows of the sheet sent to him:—". . . . has glabrous ovaries, with long pedicels, for which combination none of our willows will account but *S. nigricans.* It is curious that (on my specimen) there is no more evidence of *S. nigricans.*" This applies equally to our own herbarium examples. *S. phylicifolia*, though decidedly scarce, does grow in the district; but we saw nothing of *S. nigricans*, and there is no sign whatever of it in the wood or the foliage. Thus it seems likely that we have to deal with a new, glabrous-fruited variety.

Eriophorum latifolium Hoppe. 96. Heathy bogs near the Allt an t' Sluie (1600 ft.).

Carex atrata L. 96. Coire Chuirn, at 2400 to 2600 ft. Recorded by Messrs. H. & J. Groves in 1886 from the Larig Ghru Pass, the only other station in E. Inverness.—*C. canescens* L. (*curta* Good.) var. *fallax* F. Kurtz (ex Ascherson & Graebner, *Synopsis*). *89. Allt a' Chama Choire, Atholl Forest. *96. Allt a' Choire Chais; Allt Coire Chuirn. By streams and in peaty bogs, from 2600 to 2800 ft.; locally abundant. — *C. aquatilis* Wahl. var. **epigeios* Laestad. 89. Peaty bogs near the Allt a' Chama Choire, at 2600–2700 ft. Spikelets very dark; plant often dwarf, perhaps owing to the dry season. Mr. Arthur Bennett agreed that our plant was either this variety or very near it. A hybrid with *C. Goodenowii* Gay also occurred there; the local form of this second parent had very narrow leaves, black spikelets, and stems from seven to ten inches high. — **C. Goodenowii* × *rigida.* 96. Bog near the Allt Coire Chuirn, at 2700 ft.; very scarce.—*C. rariflora* Sm. 89. Locally plentiful in spongy bogs near the Allt a' Chama Choire (2600 to 2800 ft.). The only other known Perthshire station is on Meall Odhar, close to Canlochan Glen, and just within the same vice-county. 96. Near the head of Allt Coire Chuirn and Allt a' Choire Chais. These three stations are practically one.—*C. vaginata* Tausch. 96. Sparingly at 2300 ft., on cliffs above Loch Dubh; we believe that it was also seen in Coire Chuirn, but no specimens were kept. — **C. capillaris* L. 96. Coire Chuirn, with *C. atrata.*

Alopecurus alpinus Sm. 96. Allt Coire Chuirn, between 2500 and 2800 ft.; it flowered very little, that year.

Poa nemoralis L. 96. A peculiar alpine form or variety grows above Loch Dubh. Mr. Bennett was much interested in it, but could suggest no name, as it was rather young.

Athyrium alpestre Milde. 96. Rocks at the head of Coire Chais, and remarkably luxuriant on Ben Alder, where it is plentiful up to 3600 ft. One small plant of *A. flexile* Syme was found at the top of the eastern corrie.

Lycopodium annotinum L. 96. In profusion on a heathy moorland below Coire Bhathaich, about two miles south-east of Dalwhinnie; not observed elsewhere.

THE GENUS CTENOMERIA.

By Sir David Prain, F.R.S.

The South African Euphorbiaceous genus *Ctenomeria* was established by Harvey in 1842 (Hook. Lond. Journ. Bot. i. 29) for *C. cordata* Harv., a Natal plant collected by Krauss. This species, which has otherwise all the facies of a *Tragia*, has 50–60 stamens in place of the usual 3; its generic status was deduced by Harvey from this fact. In 1845 Hochstetter (Flora xxviii. 85) based upon "Krauss 186" his species *C. Kraussiana*. Failing to find in its male flowers more than 40 stamens Hochstetter was satisfied that this plant must be specifically distinct from that on which *C. cordata* Harv. was founded. In another plant, also a *Ctenomeria*, collected in the Uitenhage division by Drège, and issued as Drège 8239, Hochstetter did find 60 stamens; this plant he therefore concluded must be the one intended as *C. cordata* by Harvey. But the examples of *C. cordata* Harv. in herb. Kew and herb. Dublin also bear the number "186," so that the type of *C. cordata* is a co-type of *C. Kraussiana*, and these two names denote one species. We now know that the range of variation in the number of stamens is from 30 to 60. The large number of stamens in the male flower is not the only effective character in differentiating *Ctenomeria* from *Tragia*; quite as important is the circumstance that in *Ctenomeria* the styles are long, slender, flexuous, free, and fimbriately stigmatic throughout their length.

The genus was accepted by Endlicher in 1843 (Gen. Pl. Suppl. III. 98); by Sonder in 1850 (Linnaea xxiii. 110); by Baillon in 1858 (Etud. gén. Euphorb. 494), and in 1862 (Adansonia iii. 161). But in 1866 Müller (DC. Prodr. xv. 2, 925), while keeping *Ctenomeria* apart from *Tragia*, associated with it, owing to both having numerous stamens, the genus *Leptorhachis* Kl. based by Klotzsch in 1841 (Wiegm. Archiv. vii. 189) on a Brazilian species which differs markedly from *Ctenomeria* as regards the nature of its anthers and of its styles. In 1868 Hooker (Harv. Gen. S. Afr. Pl. ed. 2, 339) did not admit that *Ctenomeria* is congeneric with *Leptorhachis*. Shortly thereafter Müller reconsidered his conclusion, and in 1874 (Mart. Fl. Bras. xi. 2, 403) reduced *Leptorhachis* to *Tragia*, a proceeding which only concerns us because Müller at the same time reduced *Ctenomeria* to *Tragia*. In 1880 Bentham, (Gen. Pl. iii. 329) after showing how little ground there is for uniting *Leptorhachis* and *Ctenomeria*, again reduced both to *Tragia*. In this Bentham was followed by Pax in 1890 (Nat. Pflanzenf. iii. 5, 65) with, however, the improvement of treating both *Leptorhachis* and *Ctenomeria* as distinct sections. Pax might, as regards the latter, have treated it as the valid genus it is. Instead, he reverted in 1898, perhaps unintentionally, to Müller's position of 1874 by publishing as *Tragia Schlechteri* Pax (Bull. Herb. Boiss. vi. 735) a Natal plant which is certainly a *Ctenomeria*, and is perhaps too closely related to *C. cordata* Harv.

Hochstetter was not the only author who felt doubtful as to the number of species included in *Ctenomeria*. The plant in which he failed to find more than 40 stamens, which is not only the basis of *C. Kraussiana* but also that of *C. cordata*, differs from Drège 8239 in being nearly glabrous instead of distinctly pubescent, and in having crenate or subentire ovate-cordate leaves in place of dentate and often shortly acutely 3-lobate ones. Hochstetter has explained that, from its description, the plant which Thunberg named *Tragia capensis* in 1794 (Prodr. Pl. Cap. 14) and in 1823 (Fl. Cap. ed. Schult. 37) must be a *Ctenomeria* not a *Tragia*, though in the absence of specimens it was unsafe to say whether the plant of Thunberg was the same as that of Drège or as that of Krauss. We find then that of these two forms of *Ctenomeria* the glabrous one received a new name *C. Kraussiana* Hochst., while the name *C. cordata* Harv., which really belonged to the glabrous form, was transferred to the pubescent one.

Sonder only accounted for one species, which he described as *C. Kraussiana*. His description was based on specimens distributed by Ecklon & Zeyher as "71," and by Ecklon as "3845." These specimens agree with each other and with "Drège 8239," so that Sonder in effect reversed Hochstetter's arrangement; *C. Kraussiana* Sond. is precisely equivalent to *C. cordata* Hochst., and as a result the *C. cordata*, of which Sonder suggests that *C. Kraussiana* Sond. vix Hochst. may be only a variety, is really *C. cordata* Harv. It would appear, however, that Sonder had no opportunity of examining a specimen of this glabrous form, his knowledge of which was derived from the description by Harvey; there is, however, a definite reference to that glabrous form (Linnaea xxiii. 109) as *C. capensis* Harv., under *Tragia rupestris*, *β glabrata* Sond.* The use of this name may be due to Sonder having received from his friend Harvey an intimation that the pubescent *Ctenomeria* was congeneric with, yet specifically distinct from, the nearly glabrous *C. cordata* Harv., and that this pubescent one is identical with *Tragia capensis* Thunb. Against this suggestion, however, is the fact that Sonder, while identifying *T. capensis* Eckl. & Zeyh. with the pubescent *Ctenomeria*, did not, any more than Hochstetter, venture to identify either it or the glabrous one with *T. capensis* Thunb., and the further fact that, in using the name *C. capensis* Harv., Sonder did so in such a fashion as to restrict it to the glabrous form which Harvey had actually described as *C. cordata*. The only reasonable explanation of the use of the name *C. capensis* Harv. by Sonder is that Sonder wrote it by accident in place of *C. cordata* Harv.

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* This plant was treated by Müller in 1866 (DC. Prodr. xv. 2, 940) partly as *T. rupestris*, *β glabrata* Sond., partly as *T. rupestris*, *γ minor* Müll.-Arg. The latter is a valid species, *T. minor* Sond. (Linnaea xxiii. 108). So too is the former, and this fact Müller at one time himself appreciated, for in herb. Stockholm he wrote the species up as *T. affinis* Müll.-Arg. This name has since been published (*Kew Bulletin*, 1912, 334). Unfortunately in 1894 a Mexican species, *T. affinis* Robinson & Greenm. (Proc. Am. Acad. xxix. 393) was described under the same name; it is therefore necessary to alter the name *T. affinis* Müll.-Arg. non Robinson & Greenm. to *T. Wahlbergiana*.

This is not the only difficulty connected with Sonder's treatment of *Ctenomeria*. In 1843 E. Meyer (Drège Zwei Pfl. Documente 226) had issued as *Tragia capensis*, or as *Tragia capensis β*, certain plants collected by Drège under the belief that they are, or belong to a variety of, *T. capensis* Thunb. This is true of a specimen collected by Drège at Galgebosch, in Uitenhage, which is identical with Drège 8239, but it is not true of any of the other specimens collected by Drège, and issued as *T. capensis* by E. Meyer.*

Baillon's treatment of the specimens known to him marks a distinct advance on that of Hochstetter and Sonder. The two plants, Drège 8239 and Krauss [186], which Hochstetter had treated as distinct species, Baillon treated as one species, under the name *C. cordata* Harv. But while taking this step Baillon still maintained *C. Kraussiana* Sond. vix Hochst.; not having seen either of the specimens cited by Sonder, and apparently confused by the double citation of *Tragia capensis*, Baillon was in doubt as to whether Sonder's plant could be a *Ctenomeria* at all. This doubt was not justified; *C. Kraussiana*, as described by Sonder, is not exactly *C. Kraussiana* Hochst.; it is, however, exactly *C. cordata* Hochst. non Harv., and is, moreover, exactly *Tragia capensis* Thunb.; what Baillon, had he been aware of these facts, must have done was not to suggest the exclusion of *C. Kraussiana* from the genus, but to include it in his widened *C. cordata*. The doubt expressed by Baillon in 1862 explains the suggestion of Hooker in 1868, that in the genus *Ctenomeria* there are 1–2 species.

It is interesting to note that, while Baillon was certainly right in treating the pubescent *Ctenomeria* and the nearly glabrous one as conspecific, there would appear, after all, to be another recognisable South African form. This is the species described by Pax in 1898 (Bull. Herb. Boiss. vi. 735) as *Tragia Schlechteri*, from Natal specimens collected by Schlechter. This differs from the other species in being still more pubescent, and in having deeply 5-lobed leaves with the lobes usually obtuse. As regards its flowers, this plant is not distinguishable from *C. capensis*, and further field study may supply links connecting the two.

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* These specimens, from Pondoland and Natal, named *T. capensis* or *T. capensis β* by Meyer, represent two states, a more pubescent and a nearly glabrous, of a climbing *Tragia*. Taken conjointly these two conditions constitute *T. capensis* E. Mey. ex Sond. (Linnaea xxiii. 110) and ex Baill. (Adansonia iii. 162); Sonder and Baillon were right in considering that *T. capensis β* does not, as E. Meyer supposed, differ varietally from the more pubescent form, mistaken by E. Meyer for the true *T. capensis* Thunb., which is really a *Ctenomeria*. Müller in 1886 (DC. Prodr. xv. 2, 938) after eliminating the true *T. capensis* as *Leptorhachis capensis*, in intention followed E. Meyer, and altered the name *T. capensis* E. Mey. ex Sond. & Baill. non Thunb. to *T. Meyeriana*, *α hirsuta*, and *β glabrata*. But while *T. Meyeriana*, *β glabrata* Müll.-Arg. is exactly *T. capensis β* E. Mey., *T. Meyeriana α hirsuta* Müll.-Arg. is a mixture of a pubescent form of *T. Meyeriana β glabrata*, and of a very distinct erect and *never twining* species which Drège did not collect and Meyer never saw. Of these two strikingly distinct species, one erect, the other twining, the one which has been described by Müller is the erect species; the name *T. Meyeriana*, therefore, must be retained for the species with which Meyer had nothing to do. For the intelligent segregation of these two species, as *T. Bolusii* and *T. durbanensis* respectively, we are indebted to Dr. O. Kuntze (Rev. Gen. Pl. iii. 2, 293). His name *T. Bolusii* for the erect plant must unfortunately be sunk in *T. Meyeriana* Müll.-Arg., but his name for *T. durbanensis* stands because *T. capensis* E. Mey. non Thunb., which is its precise homonym, though accepted by Sonder and by Baillon, was not accompanied by a description.

CTENOMERIA Harv. (1842).

Hook. Lond. Journ. Bot. i. 29; Endl. Gen. Pl. Suppl. iii. 98; Hochst. apud Krauss in Flora xxviii. 85; Baill. Étud. gén. Euphorb. 494; Hook. f. in Harv. Gen. S. Afr. Pl. ed. 2, 339.

Tragia Thunb. Prodr. Pl. Cap. 14 et in Fl. Cap. ed. Schult. 37; Müll.-Arg. in Mart. Fl. Bras. xi. 2, 403; Benth. in Benth. & Hook. f. Gen. Pl. iii. 329; Pax in Engl. & Prantl, Nat. Pflanzenf. iii. 5, 65: omn. pro parte, nec Linn.

Leptorhachis Müll.-Arg. in DC. Prodr. xv. 2, 925: pro parte, nec Kl.

Flores monoici, apetali; discus 0. Fl. ♂: *Calyx* in alabastro globosus, per anthesin valvatim 5-partitus. *Stamina* 30–60, pluriseriata, filamentis tenuissime capillaribus liberis; antherae anguste oblongae introrsum longitudinaliter 2-rimosae. *Ovarii rudimentum* 0. Fl. ♀: *Calyx* alte 6-partitus, segmentis 2-seriatis imbricatis pinnatifidis. *Ovarium* 3-loculare; styli 3, elongati, flexuosi, liberi, indivisi, ubique dense papillosi; ovula in quoque loculo solitaria. *Capsula* 3-dyma, in coccos 2-valvos dissiliens. *Semina* globosa, ecarunculata; testa crustacea; albumen carnosum; cotyledones latae, planae. *Herbae perennes*, volubiles, pubescentes vel fere glabrae. *Folia* alterna, petiolata, basi cordata, margine saepe plus minusve lobata. *Racemi* terminales vel oppositifolii, androgyni floribus ♂ in parte superiore glomeratis ♀ in parte inferiore singulis.

1. CTENOMERIA SCHLECHTERI. *Folia* palmatim 5-lobata lobis centrali lateralibusque oblongis basalibus suborbicularibus omnibus obtusis vel subacutis, utrinque sed praesertim subtus secus nervos setulosa.—*Tragia Schlechteri* Pax in Bull. Herb. Boiss. vi. 735 (1898).

NATAL: secus fl. Umkomanzi, 3000 p.s.m., *Schlechter*, 6701!

2. CTENOMERIA CAPENSIS Harv. ex Sond. in Linnaea xxiii. 109 (1850). *Folia* triangulari-ovata saepe breviter raro altius 3-lobata lobis acutis vel breviter acuminatis, nunc utrinque plus minusve pubescentia, nunc supra glabra subtus parce puberula.—*Tragia capensis* Thunb. Prodr. Pl. Cap. 14 (1794) et in Fl. Cap. ed Schult. 37 (1823); E. Mey. in Drège, Zwei Pfl. Documente 226, quoad spp. Galgebosch tantum (1843); Hochst. apud Krauss in Flora xxviii. 86 (1845). *Ctenomeria cordata* Harv. in Hook. Lond. Journ. Bot. i. 29 (1842); Hochst. apud Krauss in Flora xxviii. 86 (1845); Baill. Adansonia iii. 161 (1862). *C. Kraussiana* Hochst. apud Krauss in Flora xxviii. 85 (1845); Sond. in Linnaea xxiii. 110 (1850); Baill. Adansonia iii. 161 (1862). *Leptorhachis capensis* (forma "*luxurians*" inclusa) Müll.-Arg. in DC. Prodr. xv. 2, 926 (1866).

Colonia capensis: in ditione George; prope George, *Mund & Maire*, 245! in ditione Knysna; in silvis Knysnae sinusque Plettenberg, *Bowie*! inter fl. Keurbooms et fl. Bitou, *Burchell*, 5292! in ditione Humansdorp; prope Humansdorp, 200 p.s.m., *Kennedy*! *Macowan*, 314! in ditione Uitenhage; prope Uitenhage, *Thunberg*! *Ecklon*, 676! *Zeyher*, 3845! prope fl. Coega atque in montibus Winterhoek, *Ecklon & Zeyher*, 71! Galgebosch, *Drège*! secus fl. Bosch, *Drège*, 8239! Kleine Place, *Prior*! in ditione Albany; apud Howison's Poort prope Grahamstown, *Mrs. Hutton*! *Mrs. Barber*, 113! *Williamson*! in ditione Komgha; prope fl. Kei ostium, *Flanagan*, 451!

Transvaal: in ditione Barberton; apud Umvoti Creek, 3000 p.s.m., *Galpin*, 1002!

Caffraria: in ditione Transkei; apud Kentani, 1000 p.s.m., *Dna. Pegler*, 287!

Natal: Durban, *Krauss*, 186! *Gueinzius*! *Ecklon & Zeyher*, 792! *Gerrard*, 310! *Gerrard & McKen*, 604 partim! *Rehmann*, 8807! prope Clairmont, *Schlechter*, 2843! Berea, 200–300 p.s.m., *Wood*, 6335! Inanda, *Wood*, 707! 801! in ditione Alexandra, apud Dumisa, 2000 p.s.m., *Rudatis*, 799!

SHORT NOTES.

The Colour of Papaver hybridum L.—In Hooker's *Student's Flora of the British Isles*, ed. 3, the flowers of *P. hybridum* are described as "*scarlet* with a black disc," and those of *P. Argemone* L. "smaller and paler." In France the flowers of *P. hybridum* are not scarlet, but pale purplish red or wine-colour, with a black blotch at the base of each petal. Gillet & Magne say "*rouge pourpre*," Coste "*rouge violacé*," Ardoino "*rouge purpurin*," and Arcangeli "*rosso vinoso*." The petals in the bud stage seem to be redder—*i. e.* more scarlet; and the anthers of unopened specimens are a beautiful pale blue, turning more slaty afterwards. The petals are broadly ovate, 18–20 mm. long, the largest I measured being nearly an inch in length, and they are ragged at the top. Here, at Carqueiraune, in the Var, the petals are so fugacious that one day at 11.30 I passed a small field red with them, and at 12.15 not a flower was left. This peculiarity, in addition to the scarcity of the plant in England, makes me think that the flowers may be little known at home. I remember seeing fresh flowers only once or twice in England; but have a vague notion that I have old herbarium specimens from Somerset with almost scarlet petals. It is hardly possible the colour could get redder in the process of drying, especially if exposure to the light and sun tends to make living specimens somewhat paler. Having made this small discovery, is it possible that the less amount of sunshine in England may account for the flowers being "scarlet"? If so, it is contrary to what is usual in the case of Alpine flowers found naturally or cultivated in Britain. I have no other British "Flora" here to consult, and merely send this note in case other botanists in Britain agree with Hooker in the colour of the flowers, for, if so, the British plant may not be identical with what is known as *Papaver hybridum* L. = *P. hispidum* Lamk. in France. The root-leaves have a petiole as long as the leaf, while the stem-leaves are sessile. On the under side of the leaves the petiole has a prominent raised rib clothed with long bristly hairs, which continue upwards along the centre of the leaf segments. The peduncles supporting the buds are always much deflexed, and afterwards assume an erect position.—H. S. THOMPSON.

PALUDELLA SQUARROSA IN CUMBERLAND?—While engaged in working through the collection of Mosses made by the late Rev. Augustin Ley, which, together with his collection of Flowering Plants, have been left to the University of Birmingham, I have found a specimen of *Paludella squarrosa*, gathered by Mr. Ley, labelled "Scawfell Pikes, Cumberland, August 1871." The specimen consists only of a single stem, probably found among other mosses, and sent in 1874 to Mr. H. Boswell for verification. I wish to draw attention to this specimen so that search may be made for the moss in the above locality, with the hope that it may be found to be still growing in Britain.—E. CLEMINSHAW.

REVIEW.

Wissenschaftliche Ergebnisse der Deutschen Zentral-Africa-Expedition, 1907–1908, unter Führung Adolf Friedrichs, Herzogs zu Mecklenburg. Botanik: herausgegeben von Dr. J. MILDBRAED. Parts i–v. Leipzig: Klinkhardt & Biermann, 1910–1912 (Price 21 m. 60 pf.).

THIS work is a record of the botanical results of an expedition to Central Africa under the leadership of Adolph Friedrich, Duke of Mecklenburg. The object of the expedition was a systematic exploration of the North-west portion of German East Africa, and of the great valley from Lake Kivu to the Albert Nyanza and the neighbouring districts of the Congo Free State, whence a course was taken across the continent to the Cameroons. The numerous memoirs by well-known experts contained in this record bear eloquent testimony to the conscientious thoroughness with which the task was executed. Our German brethren enjoy a deservedly high reputation for energy and enthusiasm in the field, a reputation in no wise dimmed by Dr. Mildbraed, who accompanied the expedition as botanist and under whose editorship the work has been published. In the first part the Pteridophyta and Monocotyledones are dealt with, the Ferns and the Orchids specially predominating; the second treats of the remaining Cryptogamia, with the Mosses and Hepaticæ as chief items; parts 3 and 5 are concerned with the choripetalous Dicotyledones; while to the Sympetalous part 4 is dedicated, its chief constituents being the Rubiaceæ and Compositæ.

The value to science of work of this kind is twofold. On the one hand it introduces to notice forms, generic and specific, hitherto unknown; on the other it adds to the information we possess relative to the distribution of forms already brought within our ken. It is obvious that to obtain lasting results in both these departments, careful examination of literature is necessary; for if the distribution be insufficiently stated, one knows that records have been missed, and this being so, descriptions also may have been overlooked. When they are given, the references to distribution are usually trustworthy, but this can scarcely be said of all of them, as the few instances which follow will show. Thus we are told that the West African *Dictyandra arborescens*, found by Dr. Mildbraed in the Beni district, has not been met with hitherto so far to the east, whereas its range has been known for some years as extending to Uganda. Again, *Gardenia tigrina*, said to have occurred previously only in Angola, has also been recorded as a Uganda plant. *Heinsia pulchella*, too, known as an East African species with a range as far south as Gazaland, is mentioned as hitherto from West Africa alone, and more strange still, *Randia octomera* as only from the Congo, whereas it was originally described from a plant raised from Fernando Po seeds, and Nigerian specimens have for years been in our herbaria. Again, *Afromendoncia* is not restricted to West Africa, two species being members of the Madagascar flora; neither has *Crossandra guineensis* been found hitherto only on the West Coast, as we are told, for both Dr. Bagshawe and Dr. Wollaston obtained it in Uganda, and the discovery was, in each case, duly published. Moreover, *Thunbergia fasciculata* and *Dicliptera maculata* have both been previously recorded from Uganda. Incidentally, it may be remarked that the plant here supposed to be *Helichrysum declinatum* Less., found by Dr. Mildbraed in Ruanda and said to occur also in the Masai highlands, is most probably its homoplast *Gnaphalium unionis* Sch. Bip. The former, which is restricted to South Africa, so closely mimics the northern plant that without dissection it is virtually impossible to distinguish the two.

When, however, we remember the large amount of literature bearing on the Tropical African flora already extant, a few slips like the above may easily be pardoned in a work which adds so much to our knowledge. Its sixty-seven plates and the forty-six inset figures of Hepaticæ will doubtless be very helpful in future research. Dr. Mildbraed and his coadjutors have fairly earned and are hereby offered our heartiest congratulations.

S. M.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on April 17th, Mr. Edmund G. Baker gave an account of some British varieties of the Bee Orchis, *Ophrys apifera* Huds. He stated that in the typical form of the Bee Orchis the labellum is broad convex, with a terminal, reflexed appendage, brown-purple, disk spotted with orange-yellow. In 1840 Hegetschweiler, in *Die Flora der Schweiz*, described and figured *Ophrys Trollii*, a plant with the middle lobe of the labellum narrow lanceolate, elongated, purplish-red in the centre, gold at the edge. The three outer perianth-lobes lanceolate pointed. The plant came from Winterthur. In this country there appear to be a series of intermediate forms connecting the typical form with *O. Trollii*, some being more nearly allied to the former, some to the latter. The plant from Reigate, which has been called *Trollii*, closely approximates to a figure in Reichenbach's *Icones*, vol. xiv. t. 457, fig. II., but it is not very like the plant of Hegetschweiler. The plant, on the other hand, figured by Mr. White in the *Flora of Bristol* more closely approximates to the true *Trollii.* There is an interesting note in the *Phytologist*, n. s. vol. v. p. 175, on some additions to an interleaved copy of Blackstone's "Harefield Plants," formerly belonging to Peter Collinson, stating that three roots of the Wasp Orchis were found at Clifton in 1787, the lip being very narrow, yellow streaked with dark purple. There are also plants from Oxford and Lewes which are intermediate between the Reigate plant and that from Bristol.

At the same meeting a paper by Dr. Hisayoshi Takeda was communicated by Dr. Stapf on the Flora of Shikotan, the following being an abstract of his remarks:—Shikotan is the southernmost of the Kurile Islands, which are distributed in the form of a chain between Kamtschatka and Yezo, and lies between about 43° 35′ and 50′ N. and 146° 30′ and 55′ E. Its area does not perhaps exceed 140 sq. m. The island is hilly, and some of the hills are covered with forests of conifers and deciduous trees, others with dwarf bamboos—species of *Sasa.* There are many streams along which bogs and swamps are often well developed. The vegetation of this island has hardly been touched by human hands, but left in quite a primitive state. The number of the higher plants known to the author is 324, belonging to 213 genera and 62 families, of which 245, including 8 new species, are new to the flora of this island, while 136 species are not mentioned in Miyabe's *Flora of the Kurile Islands*, published in 1890, and also 58 genera and 8 families are additions to that publication. Compositæ (34), Gramineæ (26), Rosaceæ (22), Cyperaceæ (17), Ranunculaceæ (14), Orchideæ (14), Caryophyllaceæ (13), and Umbelliferæ (12) are families comparatively rich in species. Of the 324 species, 261 (83·0 per cent.) are common to Hondo or the main island of Japan, 256 (79·3 per cent.) to Saghalien, 299 (92·3 per cent.) to Yezo, 266 (69·8 per cent.) to the S. Kuriles, and 143 (41·4 per cent.) to the N. Kuriles. Thirty-five species, or 10·8 per cent., of the Shikotan flora are mainly distributed in the Archipelago of Japan (a few are, however, known to occur but seldom in Corea); 8 are endemic in the Kuriles; 35 are known from Hondo and Yezo, but not from Saghalien; and 30 occur in Saghalien and Yezo, but not in Hondo. Among those plants which are common to Shikotan (and also other islands of the Kuriles) and Yezo, or Yezo and Hondo, but not found in Saghalien, there are a number of plants which are distributed over North-eastern Asia, the Aleutian Islands, &c. These plants are believed by the author to have been introduced through the Kurile chain, but not through Saghalien. At the same time certain plants which have their headquarters in North Japan, but are not known from Saghalien, are nevertheless met with in the Kuriles. From these facts the author conjectures that La Pérouse Strait was probably formed earlier than Tsugaru Strait.

Messrs. Cassell send us two volumes which owe their principal merit and chief attractiveness to the illustrations from photographs partly in colour, "direct from Nature," by Mr. H. Essenhigh Corke. *Wild Flowers as they Grow* (5*s*. net.) has already received wide appreciation: the volume before us, the fifth series, contains twenty-five plates, representing the plants "in their habit as they lived" with remarkable success—a success, indeed, so uniform that it is impossible to single out any one for special commendation. In the other volume, *Trees and how they Grow* (6*s*. net), the fifteen autochromes are equally good: the 186 black-and-white figures, although less attractive, are useful and instructive. The text of the volumes is by Mrs. Clarke Nuttall, whom the publishers describe as "one of our foremost botanical experts." We do not think the claim to this position would be recognized by British botanists, but the letterpress to the volume on *Trees* is full and carefully compiled, and the "popular" portion which is a necessary feature in books of this kind is better done than it is in most of them—"gaped" (p. 169) should be "japed." The text to the *Wild Flowers* is slighter and less informing: take for example this paragraph from the description of the "Hedge Stachys" (why not Hedge Woundwort?): "There are five species of Stachys growing wild in our country—the once much valued Betony; the Woundwort, a doubtful native and actually known as the Stachys Germanica; the Marsh Stachys, whose smell is bad but not *so* bad; the low creeping Field Stachys; and our friend of the illustration—and all are more or less coarse and hairy herbs" (p. 177). There is no need to point out the many ways in which this paragraph is unsatisfactory and it will be noted that *Stachys alpina* is altogether ignored. There are many typographical slips—on p. 162 we have "Tabern*a*montanus" (twice) and "*Hirunclinaria*" for *Hirundinaria*.

The issue of a second edition of the *Census Catalogue of British Hepatics* (W. Ingham, 52, Haxby Road, York. 1913. 36 pp. 1*s*. net; 1*s*. 6*d*. interleaved) affords evidence of a growing interest in the study of this little group of plants—a study which underwent a long period of comparative neglect last century before a supply of adequate books and illustrations became available. The recent publication of Macvicar's *Students' Handbook* removes any valid excuse for further neglect. But since in that work the distribution of the species is only indicated in general terms, a gap remains which is usefully filled by the county records supplied in the *Census Catalogue*. These records are mainly the outcome of the activity of the Moss Exchange Club, and may be taken as authenticated. Several of the counties appear to be quite unworked, or at any rate will yield a larger output in future editions of the Catalogue.

MOSSES AND HEPATICS OF KILLARNEY.

By D. A. Jones, F.L.S.

Much has been written about the mosses and hepatics of Killarney from time to time by such ardent botanists as Moore, Carrington, McArdle, and Canon Lett, and it is difficult to add anything new to what has been published. However, a short account of the distribution of the rarer species up to the present time may prove of some interest and assistance, especially to those botanists who may visit this charming and rich spot at some future time.

During the last seven years the district has been visited by Messrs. J. Wilson, J. B. Duncan, S. J. Owen, and the writer on three separate occasions. We made our headquarters at Muckross, which is a very convenient centre from which to work the richest ground. The weather favoured us each time, and we were able to see the country at its best. The wealth of vegetation and the variety of rare species that abound, both in the higher and lower ground, cannot fail to attract the attention of the botanist who visits this wonderful locality. Every rock and tree seems to form the habitat of some rare mosses or hepatics, and it is amazing to find the number of minute rarities that a small tuft of vegetation from these places yields. Merionethshire, with its numerous deep and sheltered glens, is very rich in its cryptogamic flora, but we must admit that our county seldom approaches this favoured spot in profusion and luxuriance. Torc Glen, the *locus classicus* of the older botanists for these plants, continues to yield a fair number of rarities. Eagle's Nest compares very favourably with it for mosses and hepatics, and in some respects is even richer. Cromaglown produces some species in profusion, while the woods near the Old Weir Bridge and O'Sullivan's Cascade form a very interesting hunting-ground. The rocks, loughs, and streams in Horse's Glen and Mangerton Mountain abound in some of the most coveted species. The higher ground about Mangerton was only visited by us on three occasions. It is a rich part, where *Mastigophora Woodsii* grows, and it would well repay further investigation. *Scapania nimbosa* and *ornithopodioides*, which accompany the former in other places along the west coast of Ireland, should be looked for.

It is gratifying to know that all the rare species are well distributed throughout the district, grow in fair profusion, and appear to be well able to hold their own without much danger of extinction.

I will now enumerate some of the most interesting mosses and hepatics, and mention a few of the localities in which they grow.

Polytrichum gracile Dicks. Bog near Eagle's Nest.

Campylopus Schwarzii Schp. Abundant in the upper part of Horse's Glen.—*C. setifolius* Wils. Fine on Cromaglown and Eagle's Nest. Mangerton.—*C. fragilis* B. & S. Torc Mt.; fruiting freely.—*C. introflexus* Brid. Low-lying rocks near Eagle's Nest.

Dicranodontium longirostre B. & S. Frequent.

Dicranum Scottianum Turn. Not uncommon, and often in fruit.

Grimmia retracta Stirt. In fine tufts among *Pterogonium gracile* and *Frullania tamarisci* on rocks and boulders, shores of Upper Lake, near Cromaglown.

Campylostelium saxicola B. & S. Among scree in woods at Torc Mt. and Loo Bridge.

Leptodontium recurvifolium Lindb. Above Torc Cascade.

Trichostomum crispulum var. *elatum* Schp. Rocks, Torc Mt.—*T. tenuirostre* var. *Holtii* Braithw. Horse's Glen.—*T. hibernicum* Dixon. In fine sheets at Eagle's Nest Mt., Cromaglown and Torc Mt. Horse's Glen (sparingly). — *T. nitidum* Schp. Rocks near Dinis.—*T. tortuosum* Dixon. Not uncommon in fruit.

Ulota Drummondii Brid. Torc Gen. — *U. calvescens* Schp. Torc Glen, on hawthorn.

Splachnum ampullaceum L. Bog near Loo Bridge.

Bryum Mildeanum Jur. Mangerton Mt.

Daltonia splachnoides Hook. & Tayl. Torc Glen and Mt. Eagle's Nest.

Hookeria læte-virens Hook. & Tayl. Very fine on wet rocks by O'Sullivan's Cascade.

Brachythecium illecebrum De Not. Walls, Muckross, in fruit.

Eurhynchium circinatum B. & S. Innisfallen.

Sematophyllum demissum Mitt. Generally distributed on the lower ground and in fruit.—*S. micans* Braithw. Torc Glen, rocks near Hunting Tower, Cromaglown, Eagle's Nest, Glena and O'Sullivan's Cascade. No fruit was seen. The var. *badense* Herzog, first found in the Black Forest, Germany, occurs in Merionethshire, and at Rosthwaite, Cumberland. No trace of this form was found in Killarney.

Plagiothecium elegans Sull. At Cromaglown and near O'Sullivan's Cascade, in fruit.

Orthothecium intricatum B. & S. A peculiar green form, much more robust than the type, was gathered by Mr. Duncan on wet rocks at Eagle's Nest.

Hypnum imponens Hedw. Found by Mr. Duncan near O'Sullivan's Cascade, and submitted to Mr. H. N. Dixon, who named it this species.—*H. circinale* Hook. Much difference of opinion has existed as to whether this plant has ever been found in Killarney. No fruiting specimens were ever met with in this country, and the difference in vegetative characters between those gathered in the district and *H. cupressiforme* var. *mamillatum* Brid. was not such as to enable one to establish the occurrence of *H. circinale* with any degree of certainty, in the absence of fruit. Moreover, the difficulty was increased, according to Mr. Dixon in his *Handbook*, p. 538, because the sterile plants from these parts, upon which the record is based, differed from the true North American specimens of *H. circinale* in the lower areolation, and in the peculiar form of leaf base not being so clearly marked. Cardot, in the *Revue Bryologique*, 1890, p. 17, refers a plant gathered by Moore on humid rocks, Killarney, and distributed as *H. hamulosum* B. & S., to that species, and Dixon (Rev. Bry. 1899, p. 91) also thinks that a barren plant, gathered by Rev. C. H. Binstead in June, 1896, on a rock near Muckross, Killarney, belongs to *H. circinale*. However, in his notes upon *H. circinale* in the *Handbook* (*l. c.*), Dixon expresses a hope that fruit may be found, in order to clear away all doubts of its identity. Mr. Binstead kindly sent me a tuft of the plant already referred to. The presence of a certain lichen among the stems gave us a clue to a probable habitat in another part of the district, where we might find it. On the last day of our visit in August, 1906, we drove to Cromaglown, and in a short time we had the pleasure of finding on rocks a moss in fruit resembling *H. cupressiforme* L. in habit with denticulate leaves as in the var. *mamillatum* of that species, but with smaller capsules, not unlike *H. molluscum* Hedw., as described by Dixon in the Rev. Bry. (*l. c.*). We suspected it to be either *H. circinale* or *H. canariense* Mitt., another critical species requiring fruiting plants to prove its identity. The matter was finally submitted to Mr. Dixon, who declared that our plant was *H. circinale* Hook.

Dumortiera hirsuta var. *irrigua* Wils. In plenty at Torc Cascade in fruit.

Aneura pinguis (L.) Dum., *A. multifida* (L.) Dum., and *A. sinuata* (Dicks.) Limpr., in several places.—*A. palmata* (Hedw.) Dum. Common on decayed stumps.

Metzgeria furcata var. *fruticulosa* (Dicks.) Lindb. On trees at the base of Torc Mt. — *M. hamata* Lindb. Torc Cascade and other places.

Eucalyx obovatus (Nees) Breidl. Torc and O'Sullivan's Cascades, in fruit; frequent.

Aplozia cordifolia (Hook.) Dum. Mangerton Mt.

Acrobolbus Wilsoni (Tayl.) Nees. We saw a fair quantity of this very rare and interesting species on rocks and boulders about Torc, where a few years ago Mr. W. H. Pearson gathered it. It was in young perianth.

Plagiochila tridenticulata Tayl. Torc Cascade and Mt., O'Sullivan's Cascade. — *P. spinulosa* var. *killarniensis* (Pears.) Macv. Torc Glen, very sparingly. — *P. punctata* var. *Owenii* (Steph.) Macv. This plant was named after one of our party, the late Mr. S. J. Owen, of Croesor, by Stephani, who described it as a new species, *P. Owenii*. Macvicar, in his Brit. Hep., lately published, has reduced it to a variety of *P. punctata*, where it undoubtedly belongs. It differs from the type in form of leaf, margin almost entire, and in cell structure. A small tuft was found in Eagle's Nest by Owen in August, 1905.

Leptoscyphus cuneifolius (Hook.) Mitt. (*Clasmatocolea cuneifolia* Spruce). It grows rather freely on birch and *Frullania* on rocks at Cromaglown and Horse's Glen, also Torc Cascade, very sparingly.

Lophocolea fragrans Moris et De Not. (*L. spicata* Tayl.) Generally distributed in the glens, mixed with mosses and other hepatics.

Harpanthus scutatus (Web. et Mohr) Spruce. Eagle's Nest.

Cephalozia connivens (Dicks.) Spruce. Bogs near Hunting Tower and Eagle's Nest. — *C. hibernica* Spruce. Gathered at Cromaglown and near O'Sullivan's Cascade; also in the woods at Old Weir Bridge, on peat among *Plagiothecium elegans*.—*C. media* var. *pallida* (Spruce) Massal. Cromaglown.—*C. serriflora* Lindb. Cromaglown and near O'Sullivan's Cascade.—*C. leucantha* Spruce. Bog near Hunting Tower.—*C. fluitans* (Nees) Spruce. Bog near Eagle's Nest.

Prionolobus Turneri (Hook.) Schffn. After repeated search in the original station near the Hunting Tower, no trace of this plant was seen.

Adelanthus decipiens (Hook.) Mitt. Generally distributed.

Calypogeia Trichomanis var. *aquatica* Ingham. Bog near Eagle's Nest.—*C. arguta* Nees et Mont. Muckross, and in several places.

Bazzania tricrenata (Wahl.) Trevis. Common.—*B. triangularis* Pears. Not uncommon.—*B. Pearsoni* (Steph.) Pears. A fine tuft in Horse's Glen.

Lepidozia pinnata (Hook.) Dum. Generally distributed. Abundant below Torc Mt. — *L. trichoclados* C. Müll. Frib. In O'Sullivan's Cascade; also between Muckross and Horse's Glen, and in other places.

Herberta adunca (Dicks.) Gray. Very fine masses of this beautiful hepatic occur in many places.

Mastigophora Woodsii (Hook.) Nees. On ledges in the upper part of Horse's Glen, Mangerton Mt.

Scapania gracilis var. *laxifolia* Carr. Horse's Glen.—*S. nemorosa* (L.) Dum. Common.—*S. intermedia* (Husnot) Pears. Eagle's Nest and near Loo Bridge. — *S. curta* (Mart.) Dum. Not uncommon.—*S. umbrosa* (Schrad.) Dum. Frequent.

Radula voluta Tayl. Not uncommon in the glens. In large masses above the Cascade at Torc.—*R. Holtii* Spruce. Frequent about the falls in Torc Glen, pure on the rocks or mixed with other hepatics. Macvicar, a few years ago, detected fruit in some material which I sent him. I am not aware that fertile plants had ever been found before. Duncan met with a fine quantity of this exceedingly rare hepatic on rocks at Eagle's Nest last year fruiting rather freely. A small quantity was also seen at O'Sullivan's Cascade and on Torc Mt. Hitherto, I believe, Torc Glen was the only station in the district from which it had been recorded.—*R. aquilegia* Tayl. On wet rocks in most of the glens. —*R. Carringtoni* Jack. This rare species is common in the district. At Eagle's Nest it covers the rocks in extensive sheets. It takes the place of the common *R. complanata* (L.) Dum. which is comparatively rare here. Fruit was found at O'Sullivan's Cascade. A smaller and darker form occurs at Torc Cascade which might easily be confused with *R. Holtii.*

Pleurozia purpurea (Lightf.) Lindb. Frequents most of the bogs in the lower and upper parts.

Madotheca lævigata (Schrad.) Dum. Rather common.—Var.

killarniensis Pears. MS. Fine at Torc Glen, with the type.—*M. Thuja* (Dicks.) Dum. Shores of Lough Garagarry. Also rocks by lake near O'Sullivan's Cascade.—*M. Porella* (Dicks.) Nees. On boulders, Lough Garagarry. This very rare plant occurs in several of our rivers in Merionethshire, Devon being the only other county where it has been found outside Ireland.

Colurolejeunea calyptrifolia (Hook.) Schffn. Rocks in Horse's Glen and boulders in Torc Glen. This very minute and beautiful species can be detected in the dry state as greenish-yellow spots on *Frullania*, or on the bare rock itself.

Cololejeunea microscopica (Tayl.) Schffn. At Torc Glen and Mt. and O'Sullivan's Cascade mixed with other hepatics. — *C. Rossettiana* (Massal.) Schffn. Landing-place, Muckross Demesne, growing on *Porotrichum alopecurum* and on limestone rocks where it occurs in pure patches.

Lejeunea flava (Swartz) Nees. Frequent on trees and rocks in several places. It seems to be very rare in Torc Glen, but at Old Weir Bridge and Eagle's Nest one often meets with it.—*L. Holtii* Spruce. Fairly common at Torc Glen in pure tufts or mixed with other hepatics. Mr. Duncan has seen fine quantities on rocks on Torc Mountain in August, 1911.—*L. cavifolia* (Ehrh.) Lindb. Abundant.—Var. *planiuscula* Lindb. Fine specimens of this variety grow in the stream that flows through Horse's Glen. It is mixed with an intermediate form between this and the var. *heterophylla* Carr. — Var. *heterophylla* Carr. Not uncommon, mixed with other hepatics in many places. — *L. patens* Lindb. Fine on rocks and boulders in a stream on Torc Mt., also Horse's Glen, Cromaglown, and O'Sullivan's Cascade.

Microlejeunea ulicina (Tayl.) Evans. Common, especially on firs behind Muckross and O'Sullivan's Hotel.

Drepanolejeunea hamatifolia (Hook.) Schffn. Frequent on trees and rocks everywhere.

Harpalejeunea ovata (Hook.) Schffn. Common on damp rocks.

Marchesinia Mackaii (Hook.) Gray. Abundant in many places, especially on old walls and calcareous rocks in Muckross Demesne.

Jubula Hutchinsiæ (Hook.) Dum. Common in waterfalls.

Frullania Tamarisci var. *robusta* Lindb. Rocks, Cromaglown.—Var. *cornubica* Cart. Firs near Old Weir Bridge.—*T. maritima* Steph. A plant growing on *Arbutus* near Brickeen Bridge is mentioned by Macvicar on p. 442 in the *Handbook of British Hepatics* as closely resembling this new species, but the under leaves are less deeply bilobed and less obcuneate. Another interesting form which we found common on boulders on the shores of the Upper Lake near Cromaglown, where it is often submerged, has been submitted to Prof. Schiffner, of Vienna. It is not unlike the var. *atrovirens* Carr.—*F. microphylla* (Gottsche) Pears. On rocks and trees at Old Weir Bridge and Brickeen Bridge.—*F. fragilifolia* Tayl. Frequent. — *F. germana* Tayl. In many places, and especially about Cromaglown.

A short visit was paid in August, 1905, to Glengariff, Co. Cork.

Fissidens polyphyllus Wils. grows in a stream by Roche's Hotel, and in peaty ground near Adrigole *Campylopus Shawii* Wils., first discovered there by Rev. C. H. Binstead, still thrives, accompanied by *C. flexuosus* Brid. and var. *uliginosus* Ren., *C. pyriformis* Brid., *C. fragilis* B. & S., *C. atrovirens* De Not., and vars. *falcatus* Braithw. and *muticus* Milde, and *C. brevipilus* B. & S., with its var. *auriculatus* Ferg., a fine array of *Campylopus* species, not often found growing together within an area of a few square yards.

A NEW HYBRID ROCK-ROSE.

By the Rev. E. S. Marshall, M.A., F.L.S.

Helianthemum Chamæcistus × marifolium, n. hybr. (× **H. Bickhami** E. S. M.).—Duæ exstant formæ; hæc *H. Chamæcisto*, illa *H. marifolio* habitu propior. Prima flores habet majores; sepala sat copiose appresso- vel adscendenti-pubescentia, crinibus quam in *H. marifolio* subduplo brevioribus, albisque, nec fuscescentibus; petala sæpius rubro tincta vel ad apicem colorata; folia majora, *H. Chamæcisto* accedentia. Secunda primo obtutu *H. marifolium* pæne omnino simulat; flores parvi et folia densissime conferta parentem alteram vix indicant, sepalorum tamen pubescentia (arcte appressa, curta, rara) notam indubiam *H. Chamæcisti* præbet. Utraque forma folia exhibet (ut in *H. Chamæcisto*) *stipulata*; necnon in ambobus capsulas vidimus perfectas: ergo, ut videtur, hybridum fertile est.

Two forms occur; one approaching *H. Chamæcistus* in habit, the other, *H. marifolium*. The first has rather large flowers; sepals with fairly plentiful appressed or ascending pubescence, the hairs about half as long as in *H. marifolium*, and white, not brownish; petals frequently tinged or tipped with red; leaves rather large, approaching *H. Chamæcistus*. The second, at first sight, almost entirely resembles *H. marifolium*; the small flowers and very densely crowded leaves hardly suggest its other parent; but the pubescence of the sepals (closely appressed, short, scanty) affords a sure sign of *H. Chamæcistus*. Both forms bear *stipulate* leaves (as in *H. Chamæcistus*); we have also observed well-formed capsules in each, so the hybrid is, to all appearance, fertile.

On June 28th of last year Rev. E. F. Linton and I, guided by Mr. Spencer H. Bickham, went to Llandudno, v.-c. 49 Carnarvon, and were greatly struck by the abundance of these two species on the south side of the Great Orme's Head, above the town. Being aware that hybrids are not uncommon in *Helianthemum*, we thought that intermediates might be found, though *H. marifolium* was already quite past flower, in this warm spot; and a short search was rewarded by three or four plants of the first form being detected. A few days later Mr. W. A. Shoolbred came across the same form close by; so it is probably not scarce there. On July 9th the second form—one root only—was obtained near

the top of the west side; both parents were still in flower, the situation being much more exposed and bleak.

I adopt Miller's name (*H. marifolium*), following Mr. F. N. Williams; *Cistus canus* L. appears to differ from the British species, which has been called *H. canum* Dunal.

ALABASTRA DIVERSA.—PART XXIII.

By SPENCER LE M. MOORE, B.Sc., F.L.S.

1. PLANTARUM NOVARUM AFRICANARUM A REV. F. A. ROGERS LECTARUM PUGILLUS.*

Vernonia (§ LEPIDELLA) **Rogersii**, sp. nov. Planta fere trispithamea caule e radice sat valido sparsim fibrilloso erecto hac atque illac ramulos breves emittente hispidulo-piloso tandem glabrescente, foliis oblanceolatis vel anguste oblongo-obovatis obtusis basi in petiolum brevem latumque gradatim desinentibus supra scabriusculis subtus costa centrali pilosa exempta glabris, capitulis mediocribus subhemisphæricis circa 50-flosculosis in cymam longam laxam sparsim bracteatam oligocephalam digestis, pedunculis propriis capitula excedentibus subæquantibusve, involucri 3–4-serialis phyllis anguste linearibus ceteris gradatim latioribus intimis lineari-lanceolatis omnibus longe acuminatis necnon puberulis, corollis haud exsertis purpureis, achæniis subcylindricis (basin versus leviter angustatis) 4–5-costatis inter costas rugulosis appresse puberulis, pappi straminei squamis anguste lineari-lanceolatis acutis quam setæ scabriusculæ corollis subæquilongæ 7-plo brevioribus.

Hab. Portuguese East Africa, Machado; *Rogers*, 4527.

Caulis 5 mm. diam., longitrorsum optime sulcatus. Folia longit. 10 cm. attingentia, latit. 3 cm., sæpius vero minora, ramulorum 2–3 cm. × 6–10 mm., papyracea, in sicco viridia; costa centralis crassus, pag. inf. maxime perspicua; petioli circa 1 cm. long., 2 mm. lat., hispidulo-pilosi. Cyma speciminis unici nobis obvii circiter 30 cm. long.; hujus rami griseo-purpurei, longitrorsum sulcati; bracteæ oblongæ (summæ lineares) ± 1 cm. long. Pedunculi proprii nunc ± 1 cm. nunc ± 3 cm. long., sub capitulis dense pubescentes. Capitula 1 × 1·5 cm. Involucri phylla extima 6–7 mm., intermedia 8 mm., intima 10 mm. long., hæc trinervia, omnia viridia apice vero ipso pallide purpurea. Corollæ in toto 7·5 mm. long., harum lobi ægre 2 mm. Styli rami 2 mm. long. Achænia 2·5 mm. long. Pappi squamæ fere 1 mm., setæ 7 mm. long.

This is near *V. demulans* Vatke, from which it can be distinguished on sight by the larger capitula with their lengthily acuminate involucral leaves.

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* The types of the plants described are in the National Herbarium.

Vernonia (§ Strobocalyx) **brachylænoides,** sp. nov. Fruticosa, ramosa, ramis sparsim foliosis subteretibus longitrorsum sulcatis prima juventute pubescentibus citissime glabrescentibus, foliis parvis brevipetiolatis apice mucronatis basi plus minus obtusis margine denticulis distantibus præditis coriaceis utrobique glabis necnon pallide nitentibus, capitulis parvis 7–9-flosculosis in corymbos breves oligocephalos bracteatos griseo-tomentosos ordinatis, involucri 2–3-serialis phyllis ovato-oblongis obtusis pubescentibus interioribus quam extima plane longioribus, corollis exsertis, achæniis cylindrico-turbinatis aliquantulum compressis 4–5-costatis dense sericeis, pappi setis ciliolatis sordide albis paucis extimis reliquas circiter semiæquantibus.

Hab. South Congo, Elisabethville; *Rogers*, 10,300.

Ramuli ascendentes nisi patentes, 3–4 mm. diam. Folia 4·5–5 × 2–2·5 cm., in sicco griseo- vel badio-viridia; costa media pag. inf. optime eminens, reticulum utraque facie perspicuum; petioli circa 5 mm. long. Corymbi plerique 1·5–2 × 2–2·5 cm.; horum bracteæ oblongæ, obtusæ, tomentosæ, ± 3 mm. long. Capitula pansa (corollis inclusis) 9 × 6 mm. Involucrum 5 mm. long.; phylla extima 2–2·5 mm. long., cetera 3·5–4 mm. Corollæ purpureæ, extus glandulis nitentibus sat copiose præditæ; tubus anguste infundibularis, 5·5 mm. long.; lobi triangulares, 2 mm. long. Styli rami 2 mm. long. Achænia 2 mm. long., pappi setæ exteriores ± 3 mm., interiores circa 6·5 mm.

Near *V. glaberrima* Welw., but different in the foliage, the short few-headed tomentose cymes, the pubescent involucres, &c.

Helichrysum (Lepicline § Aptera) **angustifrondeum,** sp. nov. Caule bispithameo erecto subsimplici omnimodo crebro folioso tela araneoso-tomentosa arcte obducto, foliis sessilibus linearibus margine revolutis supra araneoso-pubescentibus deinde glabrescentibus subtus incano-tomentosis, capitulis parvis cylindrico-turbinatis homogamis circa 25-flosculosis in cymam brevem ramosam subdense agglomeratis, involucri circiter 5-serialis phyllis extimis obovato-oblongis reliquis gradatim longioribus oblongis omnibus appendice haud radiante obtusissima brunneo-straminea nitente onustis, corollis inclusis, achæniis hucusque crudis cylindrico-turbinatis glabris, pappi setis pluribus ima basi connatis deciduis scabridis sordide albis.

Hab. N.W. Rhodesia, Lake Chirengwa; *Rogers*, 8406. Also Angola, Kubango, in open woods at Gimbundo Jamaiambe; *Gossweiler*, 3975.

Caulis inferne validus, sc. 3 mm. diam., etiam sub tela manifeste striatus, superne attenuatus. Folia inferiora usque ad 4 cm. long. et 1·5 mm. lat., superiora in summa modo 1 cm. long. gradatim imminuta. Cymæ 2 cm. diam., hujus rami araneoso-tomentosi; bracteæ foliis summis similes nisi minores. Pedunculi proprii solemniter circa 2 mm. long. Capitula 4 × 3 mm. Involucri phylla extima 2 mm., intermedia 3 mm., intima 4 mm. long. Receptaculi squamæ anguste oblongæ, truncatæ, ·5 mm. long. Corollæ 3 mm. long. Antheræ simpliciter tenuiterque caudatæ. Achænia ·6 mm., pappus 3 mm. long.

The heads of this plant are much like those of *H. Lastii* Engl., but the foliage is quite different. Judging from the description, its probable affinity is with the recently published *H. leptothamnus* Moeser; but this, *inter alia*, has heterogamous heads with only fifteen florets.

Senecio Rogersii, sp. nov. Fruticulus humilis caule abbreviato erecto sparsim folioso superne ramulos paucos breves foliosos in pedunculum sat elongatum desinentes emittente griseo-pubescente cito glabro, foliis prope apicem caulis basinque versus ramulorum approximatis sessilibus oblongo-spathulatis obtusissimis basi angustatis crassiusculis in sicco aliquanto glaucis puberulis demum glabris, capitulis ramulos solitatim terminantibus mediocribus homogamis circa 35-flosculosis longipedunculatis pedunculis erectis ipso sub capitulo leviter incrassatis glabris, involucri ecalyculati campanulati phyllis 11–13 oblongis apice acutis piliferisque margine membranaceis sulcis 3–5 percursis, corollis inclusis luteis, styli ramis truncatis penicillatis, achæniis cylindricis longitrorsum pluricostatis furfuraceo-puberulis, pappi setis scabridis albis.

Hab. South Congo, Elisabethville; *Rogers*, 10,176.

Planta alt. 10 cm. vel paullulum ultra. Caulis circa 1·5 cm. alt. Folia usque ad 2 cm. long. et 7 mm. lat., pleraque vero minora. Pedunculi nudi, summum circa 8 cm. alt. Capitula 12–13 × 8–10 mm. Involucri phylla 12 mm. long., 1·5–2 (raro 2·5) mm. lat., in sicco grisea. Corollæ 8 mm., styli rami 1·5 mm., achænia 5 mm., pappus 8 mm. long.

This belongs to Muschler's § *Emilioidei*, and is nearest *S. Marlothianus* O. Hoffm., and especially the var. *minor* of that species; from this it can easily be distinguished by the more congested differently shaped leaves, the shorter peduncles, and the more numerous hair-tipped involucral leaves.

Berkheyopsis bechuanensis, sp. nov. Suffrutex fere a basi ramosus ramis foliosis patule spinuloso-hispidis, foliis oblongis vel anguste lineari-oblongis apice breviter spinuloso-acuminatis margine revolutis integris nisi dentatis pinnatifidisve sparsim ciliatis coriaceis supra verrucis crebris prominentibus scaberrimis subtus tomento albo indutis, capitulis terminalibus solitariis breviter pedunculatis radiatis, involucri campanulati 4-serialis phyllis circa medium usque liberis lanceolatis (intimis quam cetera longioribus ovato-lanceolatis) margine rigide hispido-ciliatis, ligulis longe exsertis, achæniis lineari-turbinatis albo-villosis, pappi squamis ovato-lanceolatis breviter acuminatis denticulatis vel denticulato-ciliatis interioribus exterioribus similibus.

Hab. Bechuanaland, Mahalapye; *Rogers*, 6106.

Folia pleraque 2–3 cm. long., 3–5 mm. lat., pag. sup. in sicco lutescenti-viridia. Pedunculus 2·5 cm. long. Involucri phylla extima 6–8 mm., intima 11 mm. long. Radii flosculorum ligulæ oblongæ, apice denticulatæ, 17 × 4·5 mm. Disci corollæ 6·5 mm. long. Pappi squamæ scariosæ, dilute brunneæ, circa 2 mm. long.

This I take to be conspecific with a specimen in the Kew Herbarium collected by Bolus in Bechuanaland (Hb. Bolus no. 6342), and named by him, from description, "*Berkhopsis Kuntzii* O. Hoffm.," which is described, however, as having longer and narrower leaves glandular-pilose below, larger heads and a different pappus.

Thunbergia (§ Eu-Thunbergia) **subfulva,** sp. nov. Verisimiliter suffrutex humilis caule erecto puberulo ramulos patentes vel patenti-ascendentes pilis hispidulis subfulvis sparsim pubescentes emittente, foliis distincte etsi breviter petiolatis lanceolatis vel ovato-lanceolatis sursum attenuatis apice acutis basi rotundatis 5-nervibus (nervis 2 externis in nervum marginalem arcuatum mox transeuntibus intermediis 2 folium fere totum percurrentibus) utrobique sparsim scabride subfulvo-pubescentibus, floribus in axillis solitariis, pedunculis foliis subæquilongis, bracteolis uno latere fere omnino connatis lanceolatis acutis extus subsparsim fulvo-hirsutis, calycis dentibus subulatis tubum excedentibus, corollæ tubo bracteolas plane superante fere cylindrico (medio leviter inflato) lobis obovatis quam tubus duplo brevioribus, antherarum loculis inter se subsimilibus basi incurvo-calcaratis altero barbato altero angustiore, nunc barbato nunc calvo, stigmatis labio superiore late obovato-spathulato inferiore triangulari-ovato obtusissimo.

Hab. Belgian Congo, Trehinsenda; *Rogers*, 10,400.

Videtur stirps vix spithamea. Folia 2·5–3 cm. long., 5–8 mm. lat.; petioli 3–6 mm. long. Pedunculi sub floribus pansis 3 cm. long. vel paullulum ultra, sparsim subfulvo-pubescentes. Bracteolæ 15–16 mm. long., 4·5 mm. lat. Calyx totus 2·5 mm. long., hujus dentes fere 2 mm. long., microscopice puberuli margineque ciliolati. Corollæ tubus paullulum (4·5 mm.) supra basin pulvina circulari instructus, 24 mm. long., basi 3·5 mm. lat., cito ad 4·5 mm. dilatatus, juxta medium 6 mm. ore 5·5 mm. lat. Filamenta compressa, breviores 5·5 mm., longiores 7 mm. long.; antheræ apice obtusæ, loculi (calcare incluso) 5–5·5 mm. long. Ovarium vix 2 mm., stylus 14 mm. long.; stigmatis labium sup. 2·5 mm., labium inf. 1·8 mm. long.

The place of this is evidently close to *T. proxima* De Wild., to which, on the strength of the excellent figure in the *Flore du Katanga* (pl. xxxiv.), I was at first inclined to refer it. The chief differences lie in the smaller bracteoles of *T. subfulva*, its broader-tubed corolla exserted far beyond the bracteoles, and the hairy annulus nearer the base of the corolla.

M. De Wildeman describes the leaves of *T. proxima* as "hastées ou simplement cordées à la base"; but the drawing shows them exactly like those of *T. subfulva.*

Thunbergia (§ Thunbergiopsis) **collina,** sp. nov. Caule herbaceo ascendente ramoso ramis ascendentibus interdum probabiliter prostratis ad nodos tumidis glabris, foliis sessilibus lineari-oblongis obtusis basi obtusis nequaquam amplexicaulibus uninervibus leviter crassiusculis cito glabris, floribus in axillis solitariis raro binis, pedunculis bracteolas æquantibus superantibusve sursum aliquantulum incrassatis glabris, bracteolis inter se liberis ovato-lanceolatis acutis trinervibus fere omnino glabris, calycis dentibus deltoideis obtusissimis glabris, corollæ tubo ex bracteolis eminente paullulum supra basin contracto inde gradatim dilatato lobis rotundatis abbreviatis, antherarum loculis basi barbatis loc. altero valide incurvo-calcarato, stigmatis ore triangulari angulis barbatis.

Hab. N.W. Rhodesia, Broken Hill; *Rogers*, 8642.

Folia magnitudine valde diversa, inferiora circa 35 × 4 mm., superiora adusque 8 vel etiam 9 cm. long. et 5–7 mm. lat., omnia in sicco griseolo-viridia et longitrorsum rugulata. Pedunculi 23–30 mm. long. Bracteolæ circa 22 × 8 mm. Calyx 1·75 mm. alt.; hujus dentes 1 × 1 mm. Corollæ tubus 27 mm. long., juxta medium 8 mm. faucibus 10 mm. lat.; lobi circa 5 mm. long. Antherarum connectivus apice breviter productus, loculi (incluso calcare) 3 mm. long. Stigma 4 mm. diam.

To be inserted in the genus next *T. stellarioides* Burkill, from which its different foliage and larger and broader bracteoles afford easy means for separation.

Thunbergia (§ THUNBERGIOPSIS) **glaucina,** sp. nov. Erecta, humilis, caule plerumque ramoso glabro, foliis sessilibus anguste linearibus acutis primo minute puberulis mox glabris et (ut caulis bracteolæque) aliquanto glaucis, floribus in axillis solitariis vel binis pedunculis folia interdum excedentibus fultis, bracteolis inter se liberis ovatis apicem versus attenuatis apice obtusis glabris a basi 5-nervibus nervis haud conspicuis aliquanto perlucidis et reticulum arctum ostendentibus, calycis dentibus abbreviatis deltoideis, corollæ tubo bracteolas leviter excedente paullulum supra basin constricto inde gradatim amplificato lobis obovatis tubo brevioribus, antherarum loculo altero basi obtuso barbatoque altero incurvo-calcarato aut barbato aut (verisimiliter rarius) calvo, stigmate late infundibulari ore triangulari ad angulos barbato.

Hab. South Congo, Elisabethville; *Rogers*, 10,320.

Planta 8–12 cm. alt. Folia infima parvula, 5–7 mm. long., superiora 2–3·5 cm. long., 2 mm. lat. vel etiam minus. Pedunculi compressi, glabri, plerique 1·5–3 cm. long. Bracteolæ 2·2–2·5 cm. long., summum 1 cm. lat. Calyx 1·25 mm. alt.; dentes ·5 mm. Corollæ tubus fere 3 cm. long., ima basi 6·5 mm. paullulum supra basin 4 mm. lat., faucibus 13 mm.; lobi circa 12 mm. long. Filamenta compressa, 9–11 mm. long.; antherarum connectivus ultra loculos usque ad 1 mm. productus; loculi alteri 2·5 mm. alteri 3 mm. long. Stylus 13 mm. long.; stigma 7 mm. long., ore 6 mm. lat.

Under the same number Mr. Rogers sends other specimens with linear-oblong leaves 4–7 mm. broad, but otherwise agreeing with those just described. Thus may be distinguished as var. LATIFOLIA.

The plant, which is allied to *T. stellarioides* Burkill, does not seem conspecific with any one of several recently described species having the same affinity. From *T. stellarioides* it is at once known by the leaves and the bracteoles.

Strobilanthopsis Rogersii, sp. nov. Suffrutex humilis caule erecto sparsim ramoso pubescente, foliis oblongo-oblanceolatis obtusis vel obtusissimis nonnunquam retusis basi in petiolum brevem coarctatis membranaceis utrobique microscopice glanduloso-pubescentibus, floribus ad apicem vel in axillis ramulorum brevium solitariis breviter pedunculatis pedunculis pubescentibus, bracteolis quam calyx brevioribus foliis similibus nisi minoribus, calycis basin usque divisi segmentis inter se fere æqualibus linearibus obtusis superne leviter amplificatis glanduloso-pubescentibus, corollæ tubo calycem facile superante dimidio sup. inflato lobis oblongo-obovatis apice rotundatis, antherarum loculis basi brevissime calcaratis, stylo incluso, ovulis in loculis 2.

Hab. Belgian Congo, Kamatanda, about seventy-five miles north of Elisabethville; *Rogers*, 10,329.

Planta semispithamea vel minus. Folia 1·5–2·5 cm. long., 4–8 mm. lat., in sicco viridia; petioli circiter 3 mm. long. Pedunculi summum 5 mm. long., sæpe vero breviores. Bracteolæ circa 10 × 2 mm. Calycis segmenta 14 × 1 mm. Corollæ tubus 20 mm. long., dimidio inf. 2 mm. lat., dimidio sup. 6–8 mm.; palatus valde prominens; lobi 11 mm. long. Antherarum loculi oblongi, 3 mm. long. Ovarium 3 mm. long., præsertim superne glandulis sessilibus vestitum. Stylus pubescens, 17 mm. long. Capsula 13 mm. long., deorsum angustata, apice umbonata, glandulosa, disperma.

The lowly habit, the foliage and the indumentum are the chief distinctive marks of this species.

Justicia (§ Calophanoides) **rhodesiana**, sp. nov. Spithamea vel ultra, ramosa, ramis gracilibus subdistanter foliosis ut folia, bracteolæ calycesque segmenta subtiliter pubescentibus, foliis parvis plerisque quam internodia brevioribus breviter petiolatis lineari-oblongis basi apiceque obtusis, floribus parvis in axillis solitariis vel 2–3-nis, bracteolis minutis subulatis, calycis segmentis 5 inter se subæqualibus anguste lineari-lanceolatis sursum attenuatis, corollæ tubo calyci æquilongo subcylindrico (prope basin leviter angustato) extus minute pubescente labio postico tubo paullulum longiore ovato-oblongo integro labio antico late obovato trilobo, capsula pubescente.

Hab. Rhodesia, Bulawayo; *Rogers*, 5740. Bechuanaland, Mahalapye; *id.*, 6098.

Folia raro 2 cm. attingentia, plerumque circa 10–12 mm. long., 2–3·5 mm. lat.; petioli 1–3 mm. long. Bracteolæ vix 1 mm. long. Flores verisimiliter albi. Calycis segmenta 2·5 mm. long. Corolla tota 5·5 mm. long.; tubus 2·5 × 2·5 mm.; labia 3 mm. long., labii antici lobi subquadrati fere 1 mm. long. Antherarum loculus sup. 1 mm. long., loculus inf. (incluso calcare apice truncato) 1·75 mm. Ovarium 1·5 mm. long.; stylus inferne puberulus 3 mm. long. Capsula anguste oblongo-ovoidea, obtusa, 5·5 mm. long.

This can be told easily from *J. filifolia* Lindau by its small leaves; the narrow calyx-segments and much smaller lower lip of the corolla are additional marks.

(To be continued.)

THUIDIUM RECOGNITUM (HEDW.) LINDB. AND ITS ALLIES.

BY H. N. DIXON, M.A., F.L.S.

THE difference between *Thuidium tamariscinum* (Hedw.) B. & S., *T. delicatulum* (Hedw.) Mitt., and *T. recognitum* (Hedw.) Lindb., was first clearly pointed out by Lindberg (Manip. Musc. ii. 415, in Notiser Sällsk. Fauna et Fl. fenn., förh. xi. 1870). These differences may be briefly tabulated thus:—

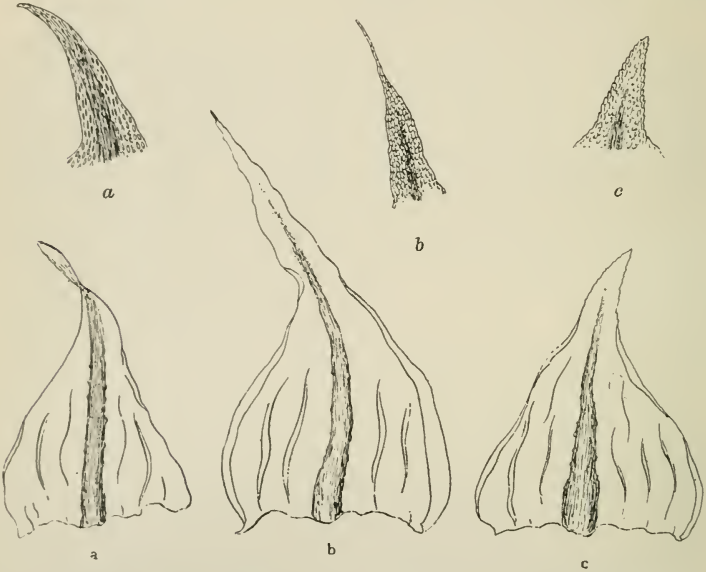
Apical cell of branch-leaves acute, smooth; perichætial leaves ciliate .... *tamariscinum.*
Apical cell of branch-leaves cylindrical, truncate, crowned with 2–4 papillæ—
  Perichætial leaves ciliate .... *delicatulum.*
  Perichætial leaves not ciliate.................. *recognitum.*

In that paper Lindberg gave the first European record of *T. delicatulum* (the common North American plant), *viz.* from Hogland, an island off Finland. It was not recognized as a British plant in the *London Catalogue of British Mosses*, 1881, nor by Hobkirk (Synops. of Brit. Mosses) in 1884. It was first detected with us by Mr. Holt, at Tyn-y-groes, N. Wales, in 1885. In 1895 I gathered it fruiting at Lodore, where the Rev. C. H. Binstead also had gathered it in 1889, taking it for *T. recognitum.* These two localities are all that were known in 1896, when the part of Braithwaite's *British Moss Flora* dealing with *Thuidium* was published. I have now ten sheets of *T. delicatulum* in my British herbarium, from about twenty distinct localities, collected by myself, besides half a dozen specimens sent by other collectors.

In 1893 Philibert described a fourth species of this group as *T. intermedium*; this name, however, having been already employed by Mitten for a New World species, Limpricht rechristened it *T. Philiberti.* The most conspicuous feature about this species was the long acumen of the stem-leaves, ending in a filiform point consisting of a single articulate thread of several linear cells. This species I gathered in Perthshire in 1893, and recorded as *T. Philiberti* in Journ. Bot. 1897, p. 16. Dr. Best, who had then very carefully studied these plants, confirmed my determination, adding, "it always grows in wet places."

As I understood the plants at that time, they could be fairly well separated with the aid of ecological characters. Thus *T. tamariscinum* was almost entirely a woodland plant, fairly universal, and known at once by the smooth, acute apical cell of its branch-leaves from the others. *T. delicatulum* was a plant of moist, *siliceous* soil in mountain woods or by waterfalls, frequently growing in sand by mountain streams, and entirely absent from the eastern parts of our islands, at least south of the Firth of Forth. It was to be known generally by the delicate, always (or nearly always) tripinnate branching, the shortly pointed stem-leaves, resembling those of *T. tamariscinum,* and the ciliate perichætial bracts. *T. Philiberti* was a rather large, straggling plant, sometimes bipinnate, more usually tripinnate, always found in wet, rocky places, and known by the filiform apex of the longly acuminate stem-leaves. *T. recognitum* then formed the residuum, was nearly always bipinnate only, had moderately long, often recurved apices to the stem-leaves, which, while often finely acuminate, did not end in the long filiform point of *T. Philiberti*; and was almost entirely confined to *dry, calcareous* habitats, frequently among grass in open places, but also, rarely, in calcareous woods. In the former station it was usually sterile, in the latter it was more frequently fruiting.

Several recent works published on the Continent, however, show that Continental bryologists have a different conception of *T. recognitum* and *T. Philiberti* from that prevailing with us.



a, *a*, *Thuidium recognitum*; b, *b*, *T. Philiberti*; c, *c*, *T. delicatulum*.

T. recognitum is described in these works as having the stem-leaves plane-margined and small, the nerve broad above and filling the acumen. It is further described as usually fertile; while *T. Philiberti* is spoken of as a more frequent plant, usually sterile, with larger stem-leaves, having recurved margins, and long, tapering points, with a weaker nerve which reaches only part of the way up the acumen.

After considerable correspondence and exchange of specimens with Continental authorities, I have at last been able satisfactorily, I think, to correlate our British plants with the Continental ones. The main result that emerges is that the plant which we have here considered as the common form of *T. recognitum*, the small, bipinnate, sterile plant of dry (calcareous) banks, quarries, chalk downs, &c., is really *T. Philiberti*; the plant of wet mountain rocks referred by me to that species, in the article previously mentioned, being the plant described by Limpricht as *T. pseudotamarisci*, but reduced by Ryan and Hagen—certainly correctly—to a var. of *T. Philiberti*, of which it is merely a robust, usually tripinnate form.

One or two points will make the matter clearer and at the same time will explain in part how the difference of view has arisen. The Continental view of the species is undoubtedly the correct one, but the distinctive characters attributed to them have been, I think, in some respects erroneous, and this has led to misunderstanding.

In the first place, *T. Philiberti* is by no means confined to wet places, as stated by Dr. Best, but is quite as frequently found on dry banks. In this case the hyaline piliform points of the stem-leaves are but little developed, and are easily lost, so that their presence is often scarcely to be detected.

In the second place, *T. recognitum* has not plane-margined stem-leaves. The margins are indeed much less strongly recurved than in the allied species, and very frequently only one margin is reflexed, and that slightly; but in all the plants received from Continental authorities as the true *T. recognitum*, I have never found the margins actually plane, except, possibly, in a single leaf here and there.

Nor does the nerve actually fill the acumen, as is frequently stated. It is quite true that it remains broad and stout, and reaches very nearly if not quite to the apex, and is very different in appearance from the structure in *T. Philiberti* and *T. delicatulum*, but this is due not only to the greater extension of the nerve, but to the fact that the cells of the lamina in the acumen become elongate, narrow and incrassate, resembling the elongate cells of the nerve itself, and thereby rendering the delimitation of the latter less easily observed. In the two allied species the cells of the acumen, while often slightly elongate are not markedly so, and are scarcely altered in character from those of the rest of the lamina, so that the acumen is of a quite different texture from that of *T. recognitum*.

The size of the stem-leaves, frequently given as a specific test, does not appear to me reliable; thus I frequently find *T. delicatulum* with stem-leaves quite as small as in *T. recognitum*.

Another character relied on by some authors is the abrupt narrowing of the stem-leaves into the acumen supposed to be characteristic of *T. Philiberti*, as compared with a gradual narrowing in *T. delicatulum*, but I have found this, in practice, quite unreliable.

For all that the two plants are really distinct, and are recognized when once known without great difficulty. The distinguishing characters may be pointed out thus:—

T. recognitum is usually a plant of calcareous woods, and is frequently fertile—much more so, probably, in relation to its rarity, than *T. tamariscinum*. The stem-leaves are small as compared with well-developed *T. Philiberti* and—usually—*T. delica-*

tulum, wider in proportion to their length, abruptly narrowed to a stout point, which is often recurved; the margins only slightly and narrowly reflexed here and there, one side often being plane. The nerve is stout and narrows but little upwards, filling a great part of the acumen, which is therefore more deeply coloured than the upper part of the lamina, and with more elongate cells, and is also more rigid than in *T. Philiberti*. *T. recognitum* is nearly always bipinnate only, and is *not* a variable plant.

T. Philiberti is, as has been stated, commonest on dry calcareous grassy banks, but is also found in quite marshy places, and also on wet rocks. In characters, as well as in habitat, it is a distinctively variable plant, both in size and branching, and in the form and size of the stem-leaves. These, however, are always more longly acuminate than in *T. recognitum*, sometimes gradually tapering, sometimes more abruptly narrowed, always finely pointed at the apex, and normally ending in the characteristic filiform point, which is, however, much better developed and more persistent in moist places than in dry situations. The margins are widely and strongly recurved, the nerve tapers above, and is soon lost in the acumen.

The true *T. recognitum* Lindb. appears to be distinctly rare with us. It occurs in the older herbaria, *e. g.* at Kew, from Matlock, leg. Sir J. E. Smith, 1820, c. fr.; and from Helks Wood, Ingleton, 1838, leg. W. Wilson. Wilson's No. 395, Musc. Brit., issued as *H. delicatulum* Linn., is also *T. recognitum*. On the other hand, the specimens at Kew labelled "In old quarry near Malton (Spruce's original locality), Yorkshire, 1854, coll. A. O. Black," and "Woolsonbury Hill, Sussex, leg. Mitten," belong to *T. Philiberti*.

The British forms of this group may be analyzed as follows:—

1	Apical cell of branch-leaves acute, smooth; perichætial bracts ciliate; tripinnate	*tamariscinum*.
	Apical cell of branch-leaves truncate, papillose	2
2	Stem-leaves small, nerve stout in acumen, percurrent or almost so; bipinnate; perich. bracts not ciliate	*recognitum*.
	Nerve of stem-leaves narrowing above and lost in mid-acumen ...	3
3	Acumen of stem-leaves short, simply acute, perich. bracts ciliate; tripinnate or more rarely bipinnate	*delicatulum*.
	Acumen of stem-leaves long, gradually tapering to a shorter or longer filiform point; perich. bracts not ciliate	4
4	Stems bipinnate	*Philiberti*.
	Stems tripinnate	var. *pseudo-tamarisci*.

Most of the records hitherto given for *T. Philiberti* in Britain belong to the var. *pseudo-tamarisci*; I have had especially fine specimens of this var. as robust and strongly tripinnate as the larger forms of *T. tamariscinum* from a tree-stump, Golspie, Sutherland, collected in 1902 by Miss H. M. Crampton.

It will be seen from the above that British records of *T. recognitum* and *T. Philiberti* will require revision.

NOTES ON MID-PERTH PLANTS.

By J. R. Matthews, M.A.

The following notes have been drawn up after several years' investigation of the flora of Dunning district in Mid-Perth, v.-c. 88. I have made constant reference to Dr. White's *Flora of Perthshire.* In that work several species, which are regarded as introduced or naturalized plants in the county, are simply referred to as having been found, and are not recorded under the usual definite formula. Some of these form part of the present list, and I am inclined to regard most of them in this neighbourhood as "outcasts." So far as I know, the plants have not been cultivated for many years past in gardens in the vicinity, and as many of them have become well established in natural habitats, it may be of some value to have the localities more fully recorded.

Those plants recorded for Dunning in "Lowland Earn" in the Perthshire *Flora* are included in the list with additional notes to bring the information regarding them in this district as up-to-date as possible.

Notes extracted from the *Flora of Perthshire* are given within inverted commas, and seven species not mentioned in the *Flora* are marked with an asterisk.

My best thanks are due to my former tutor, Mr. Barclay, for much kind assistance, and to Mr. Bennett for many valuable suggestions.

**Anemone ranunculoides* L. On the left bank of Duncrub Burn below Jockslodge Bridge. Not abundant. Flowers rather smaller than those of herbarium specimens I have seen from Kent and South Europe.

Aconitum Napellus L. "Occurs as an escape in a few places on the banks of the Tay and Earn." In Sawmill Wood.

Berberis vulgaris L. Several plants in a hedge which runs west from Monhook Wood to Broadleys.

Chelidonium majus L. "A naturalized plant in hedgerows." Fairly plentiful on the hedgebank by Station Road; near Kirklands quarry.

Claytonia perfoliata Donn. "Escape, more or less established." The dominant species of the ground vegetation in Sawmill Wood, and occurring in patches for several miles down the stream which flows through the wood. There seems to be no definite clue as to the manner in which this species has been introduced.

**Oxalis corniculata* L. Fairly plentiful at Duncrub.

Medicago sativa L. "Occurs—not commonly—as a naturalized plant." On the railway bank a little south of Dunning Station, and, I believe, merely as a casual.

**Levisticum officinale* Koch. Bridgend, Dunning. Introduced at least sixty years ago, but now growing wild.

Cornus sanguinea L. "Occurs as an escape (not planted) on the right bank of the Tummel below Pitlochry." In Sawmill Wood, probably introduced.

Linnæa borealis Gron. "Duncrub—not recently found." I fear it is now extinct in this station.

Bidens cernua L. "Whitemoss, Dunning (P. Gloag)—no recent record." I have failed to find this species at the Whitemoss.

Artemisia vulgaris L. Hedgebanks near Dunning.

Doronicum plantagineum L. Plentiful in Sawmill Wood and at St. Andrews, about a mile down the stream. This species is much more uncommon in the county than *D. Pardalianches* L., which, though not occurring near Dunning, is abundant at Dupplin five miles east.

Centaurea Scabiosa L. "Near Dunning in L. Earn (P. Gloag) (!)." Abundant on the railway bank about two miles south of Dunning Station.

Cichorium Intybus L. Has occurred for several years on meadow ground near Dalreoch; Keltie, 1912.

Hieracium aurantiacum L. "In abundance on a railway bank about a mile south of Dunning Station (Dr. F. B. White) (!)." Still abounds and seems to be spreading.

Phyteuma spicatum L. "Has occurred in shrubberies." A single plant at Duncrub, first observed by me in 1907, has flowered each year but never bears seed. Although this plant occurs rarely in Norway it is not a northern species. The question at once arises—How did it reach this station? It was certainly not intentionally introduced by man, and its occurrence here is one of those problems in seed dispersal which must remain unsolved, though speculation is possible. No species of *Phyteuma* has been grown in Duncrub Gardens for at least thirty years, but a few seeds may have been accidentally introduced with the annual seed supply; or, as Mr. Bennett suggests, seeds may have been carried with straw that had been used as packing. Instances of this occurrence have come under his personal observation.

**Lysimachia ciliata* L. Well established in Sawmill Wood.

L. Nummularia L. "Is naturalized (or native?) in several places." Several plants on left bank of Duncrub Burn opposite Parsonage.

Vinca minor L. In abundance on the banks of Dunning Burn above the village.

Symphytum officinale L. and var. *patens* Sibth. "Occur—rarely more than one or two plants—in a good many places." Considered by Dr. White to be an escape. Both the type and the variety are abundant on the south side of Steelend Den, the former being dominant. I can get no information regarding the cultivation of the plant in this district, but it used to be grown for fodder in many parts of Scotland, and I believe the plant in its present station to be a relic of cultivation.

Anchusa sempervirens L. "Is a rare escape." Fairly plentiful by the roadside opposite Findony; a few plants in Sawmill Wood.

Pulmonaria officinalis L. Plentiful in Monhook Wood.

Linaria Cymbalaria L. On walls in the village. No doubt planted.

**L. minor* Desf. As a casual at North Lodge, Duncrub, 1910, 1911.

Scrophularia vernalis L. Abundant on a sunk wall near Duncrub.

Mimulus Langsdorffii Donn. Sparsely distributed along Dunning Burn; plentiful in a marsh south of the village.

Utricularia vulgaris L. "Whitemoss, Dunning (!)." I have not succeeded in finding this plant in the loch, but as I have been limited to hand-dredging I am not in a position to say that it has here become extinct; yet I shall not be surprised if this proves true, judging from the abundance of *Elodea* and *Myriophyllum* in the loch.

Lamium maculatum L. At Jockslodge.

Plantago media L. On lawns at Duncrub, almost certainly introduced with grass seed.

Polygonum Bistorta L. Given only for "Forth" area in Fl. Perthsh. "Naturalized in a few places in some of the other districts, but not common." Well established near Millhaugh and at St. Andrews.

Humulus Lupulus L. Several plants in the hedge by Station Road; a relic of cultivation.

Elodea canadensis Michx. Plentiful in Whitemoss Loch.

Polygonatum multiflorum All. Monhook Wood; Sawmill Wood; Duncrub, not abundant.

**Muscari racemosum* Lam. & DC. At Duncrub; no doubt a relic of cultivation.

**Ornithogalum umbellatum* L. Sawmill Wood; Duncrub. Fairly plentiful at both places.

Arum maculatum L. A naturalized alien in Perthshire. Abundant in Sawmill Wood.

Alisma ranunculoides L. "Loch west of Dunning (Arnott in Fl. Scot. 1821). No recent record." I have specimens gathered in 1908. The plant still grows at this station (no doubt the Whitemoss Loch) in small quantity. I first observed the plant near the south-east corner of the loch, but, owing to the overcrowding of such marsh plants as *Potentilla Comarum* and *Menyanthes trifoliata*, it disappeared from here and reappeared on a small mud-flat at the north-east corner, a spot which it had not, to my knowledge, previously occupied.

Potamogeton filiformis Nolte. "Whitemoss, near Dunning (W. Martin) (!)." Mr. Bennett has kindly verified my gatherings, and although I have never obtained specimens in fruit, he has little doubt that the determination is correct. The plant is plentiful in the loch, the only recorded station in Fl. Perthsh. for the county. I do not know of any recent records. It is surprising that this pondweed should be "very rare" in Perthshire, for in some of the Fife lochs it abounds.

Zannichellia palustris L. "Whitemoss, near Dunning (!)." Also "very rare" in Perthshire, So far I have failed to find the plant in the Whitemoss.

Eleocharis acicularis Roem. & Schult. "Loch west of Dunning

(Arnott in *Flora Scotica*, 1821) (this is probably the Whitemoss), not recently found." Apparently extinct. This species likes open spaces, and it has probably been crowded out. During recent years the conditions of the vegetation of the Whitemoss have altered very considerably, and these changes would form an interesting ecological study.

Carex teretiuscula Good. "Whitemoss, near Dunning (!)." Plentiful at the west side of the loch.

Phalaris canariensis T. Has occurred (1907) as a casual near Dunning.

Glyceria aquatica Wahlb. "Whitemoss Loch, Dunning." Still occurs here; also plentiful in a marsh south of the village.

Poa Chaixii Vill. "Has been found at Dunkeld and Birnam. It is, of course, not a native." Kincledie Wood, evidently long established. This grass has now been recorded from a good many places in Britain, and, as Mr. Bennett has pointed out, it is either spreading or has been overlooked.

Characeæ.—My gatherings, all from the Whitemoss Loch, were determined for me some considerable time ago by Messrs. H. and J. Groves. *Chara fragilis* Desv.—*C. aspera* var. *subinermis* Kuetz. Not recorded for v.-c. 88 in Fl. Perthsh.—*Nitella flexilis* var. *crassa* Braun.—*N. opaca* Ag.—*N. translucens* Ag. Not given for v.-c. 88 in Fl. Perthsh.

SHORT NOTES.

Agrostis nigra Withering in France.—In April I found a few good specimens of this grass growing with typical *A. vulgaris* With. (Arr., ed. 3, ii. 131 (1796)) at the side of a cart-road through an arable field near Carqueiranne, Var, France. Monsieur Emile Jahandiez, who has a good botanical library, believes it has never before been recorded from France—indeed I am unaware if this little known grass has previously been noticed out of England. It is mentioned in Husnot's book on the *Grasses of France, Belgium, Switzerland, and the British Isles*, but only from a few of the English Midland counties. Since Withering's time it appears to have been overlooked until Mr. J. E. Bagnall rediscovered it near Birmingham, and published an illustrated account of it in this Journal (1882, 65, t. 227). In 1893 he pointed it out to me in arable fields in Warwickshire, and I was so struck by its appearance that not long afterwards I saw it in Somerset, and I think sent voucher specimens to the Watson Bot. Exch. Club. Here in the south of France it assumes the same rigid habit and the same brown colour. It is taller and more robust than *A. vulgaris*, with more scabrid panicle and larger spikelets. Now that its known range is so much extended it may prove to have been overlooked elsewhere.—H. Stuart Thompson.

Cornish Notes for 1912.—*Viola epipsila* Led. This was found by me at the Holy Well, Roche, v.-c. 2, in 1910, and in

1912 at Quintrell Downs, near Newquay, and Penhallow Moor, St. Newlyn East; both v.-c. 1. It is probably common in Cornwall.—*Spergularia atheniensis* Aschers. Plants from Par, v.-c. 2, which I sent to the Bot. Exch. Club as *S. rubra*, with a note expressing doubt, have been named as above by Mr. Druce. A specimen was given me by Mr. A. O. Hume in 1901 as "*S. rubra?*" This is apparently the first record for Great Britain. The status of most plants at Par is more or less doubtful, but I consider this is as native as *Linaria supina*.*—*Malva sylvestris* L. var. *acutiloba* Relak. Par, 1912.—*Trifolium repens* L. var. *phyllanthum* Seringe. Par, 1912.—*Erica cinerea* L. var. *splendens* mihi. A striking form of *E. cinerea* L. with long densely-flowered racemes, and often with large and pale flowers—found at Carnon Croft (*F. H. D.*) and Kea Down (*G. C. D.*), both in Kea parish, and at St. Newlyn East Downs (*C. C. V.*); all v.-c. 1—I have ventured to name as above.—*Plantago Timbali* Jord. Miss Cardew and Mr. E. G. Baker have lately thus determined plants which I sent in 1910 to the Bot. Exch. Club as *P. lanceolata* L. forma. Mr. Baker tells me they have seen no other British specimen of the true plant. I doubt it being a native of Par, where I collected it. —CHAMBRÉ C. VIGURS.

SENECIO SQUALIDUS L.—On May 22 I saw this in some quantity on the left hand of the line going from Uxbridge Road to Wormwood Scrubs, not far from the former station. Further on *Lepidium Draba* occurred also in some quantity.—JAMES BRITTEN.

REVIEWS.

Herbals, their Origin and Evolution: a Chapter in the History of Botany, 1470–1670. By AGNES ARBER (Mrs. E. A. Newell Arber), D.Sc., F.L.S., Fellow of Newnham College, Cambridge, and of University College, London. Cambridge University Press. Royal 8vo, pp. xviii + 254. With frontispiece, 21 plates, and 113 text-figures. Price 10*s.* 6*d.* net.

IN this Journal for 1910 (p. 112) we noticed at some length *The Craftsman's Plant-Book*—a collection of figures of plants from sixteenth-century herbals arranged for the use of the decorator by Mr. R. G. Hatton. What Mr. Hatton thus did—and did well—for the artist, Mrs. Arber has done for the botanist, and not for him alone, but for all who are interested in our early scientific literature, and more especially in the history of the development of science and art.

We do not think a book on Herbals could have been better done, and the only point on which we differ from the author is the statement in the first sentence of the preface that the work "calls

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[* But is *L. supina* certainly native? and can a plant given under a doubtful name and not published be considered a "first *record*"?—ED. JOURN. BOT.]

for no apology." There is, indeed, as she says, "a multitude of books about books," very many of which might be described as *biblia a non biblia*, but a work such as this which she has given us, stamped as it is throughout with evidence of thorough knowledge of a branch of literature generally unknown, can only be regarded as a valuable addition to our sources of information.

Considering the number of books which are put forth dealing with the popular aspects of botany, it is astonishing how few of them betray even a superficial acquaintance with our early botanical literature. "Dear old Gerarde," indeed, figures prominently enough, certain stock quotations being copied from one author to another, often sufficiently indicating that the references have not even been verified. But his predecessor William Turner and his contemporary and successor John Parkinson rarely figure in popular books, although the admirable English of the latter, more especially in his *Paradisus*, might well have obtained for him a place. (It may be said in passing that Dr. Arber's book is as admirable from the literary standpoint as it is in all other respects.)

The book is divided into nine chapters, dealing respectively with the Early History of Botany; the Earliest Printed Herbals (Fifteenth Century); the Early History of the Herbal in England; the Botanical Renaissance of the Sixteenth and Seventeenth Centuries (treating of the Herbals of Germany, the Low Countries, Italy, Switzerland, France, and England, with an interesting disquisition on the Revival of Aristotelian Botany); the Evolution of the Art of Plant Description; the Evolution of Plant Classification; the Evolution of the Art of Botanical Illustration; the Doctrine of Signatures, and Astrological Botany; and Conclusions. To these are added appendixes giving a chronological list of the principal herbals and related botanical works published between 1470 and 1670, and a list, in alphabetical order, of the principal critical and historical works dealing with the subjects discussed in this book, with of course an excellent index. Each of the divisions is treated with a thoroughness which leaves nothing to be desired, and the book throughout is illustrated by an admirable selection of plates (21) and text-illustrations (121) excellently reproduced, including a number of portraits and two beautiful reproductions of drawings by Albrecht Dürer and Leonardo da Vinci. We are especially glad to see the portraits of Leonard Fuchs's draughtsmen and engraver, to which we referred in the notice already referred to, and to note Dr. Arber's high appreciation of the author: "Of all the botanists of the Renaissance, Fuchs is perhaps the one who deserves most to be held in honour; . . . his herbal rivals or even surpasses that of Brunfels in its illustrations and that of Bock in its German text."

The scholarship which characterizes the book extends to every detail—in the list of illustrations, for example, the source of each is indicated, and the bibliographical appendixes are models of their kind. The volume is beautifully printed and suitably bound, and in every respect reflects credit upon the Cambridge University Press, which moreover has produced it at a very reasonable price.

BOOK-NOTES, NEWS, &c.

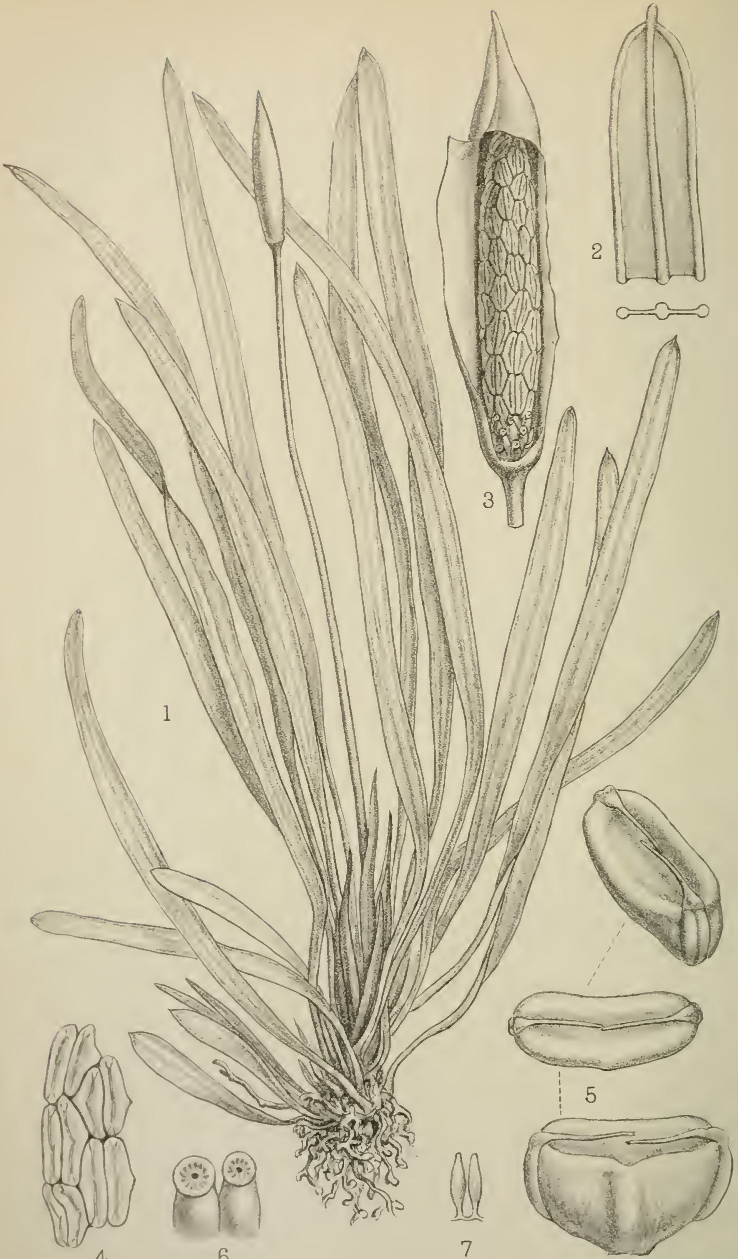
At the meeting of the Linnean Society on 3rd April, Mr. C. E. Salmon exhibited a large series of forms of *Alchemilla vulgaris* Linn., on which he made the following remarks. During a short holiday in Scotland last year, all the known British forms were met with. There are three main sections, *Pubescentes*, *Hirsutæ*, and *Subglabræ*. *A. pubescens* Buser represents the first section (which also includes *A. hirsuticaulis* Lindb. and *A. plicata* Buser); all these are more or less wholly densely sericeous. *A. pubescens* is not British, but occurred last year in a wild situation in Surrey (see p. 141). In the *Hirsutæ* section, we get three out of the four British species. The first, *A. pratensis* Schmidt, is widely distributed over the British Isles and Ireland; the glabrous flowers, hairy stem, and glabrous upper leaf-surface help to distinguish it. *A. minor* Huds. is the next and is our most frequent form; may be known by its hairy pedicels and flowers. The third, *A. minor* subsp. *filicaulis* Lindb., is extremely local in Britain, only occurring in a few stations in Scotland, but widely distributed in Norway, Sweden, Faroes, &c. It is less hairy in all its parts than *A. minor*; the pedicels and top of stem are glabrous. The remaining British species, *A. alpestris* Schmidt, belongs to the section *Subglabræ* and is much more glabrous than any of the others in stem, leaves, &c. Its distribution in Britain is more northern than that of *A. pratensis* or *A. minor*, but an isolated colony exists in Sussex. *A. acutidens* Lindb. was reported from Ben Lawers in Aug. 1911, on the occasion of the Phyto-Geographical Excursion: Dr. Lindberg has now named the original plants of the 1911 gathering as autumnal states of *A. alpestris* (see p. 141). The other non-British species are—under section *Hirsutæ*—*A. pastoralis* Buser, leaves pilose above, pedicels glabrous; *A. micans* Buser, with the veins on the under leaf-surface shining; *A. subcrenata* Buser, leaves much less hairy above and teeth broad and obtuse; and *A. acutangula* Buser, with long, more or less acute, leaf-lobes. Under *Subglabræ* comes *A. obtusa* Buser, which is close to *acutidens* but has broader leaf-lobes and teeth, and sepals and episepals broader and shorter; and *A. glomerulans* Buser, with flowers in somewhat close heads. From the careful maps prepared by Dr. Lindberg, showing the distribution of these various forms, it will be seen that Great Britain may yet claim some of them as true natives.

Messrs. Dent have added to their shilling "Temple Primer" series a very excellent little volume on *Plant Geography* from the pen of Mr. G. S. Boulger. Into small compass the author has compressed a vast amount of information, which he divides into four "books," the first dealing with the evolution of the plant-world, the second with the factors of distribution, the third with floristic regions, the fourth with botanical ecology or to geography. An excellent bibliography shows that Mr. Boulger is fully acquainted with the literature of his subject, to which he acknowledges his obligations, and there is a useful index. The name of the author is sufficient guarantee that the work is carefully done.

We have received the first number of *The Journal of Ecology*, which is edited for the British Ecological Society by Mr. Frank Cavers. It contains papers on the Vegetation of Blakeney Point, Norfolk, by Prof. F. W. Oliver, and on Raunkiaer's Life Forms and Statistical Methods by Mr. William G. Smith. Mr. Tansley contributes a long and important critical review of Brockmann-Jerosch and Rübel's suggestions for "a Universal Classification of Plant-Communities": there are also briefer articles, and exceedingly interesting and valuable summaries of recent ecological work at home and abroad. The Journal (a small quarto), which is to appear quarterly—the present, issued May 5, is the March number—is beautifully printed. Each number costs five shillings net; members of the Ecological Society (the subscription to which is a guinea annually) receive it free by post, and, if we may judge by the first number, will obtain full value for their money.

By desire of the Committee of the Somerset Archæological and Natural History Society, the Rev. E. S. Marshall, of West Monkton Rectory, Taunton, is preparing a Supplement to Murray's *Flora of Somerset*; he will be grateful for any new information, which should reach him not later than the end of October. In the case of critical forms, he would like to see specimens (to be returned, if not duplicates). A good deal of work has been done since 1896, especially in the north of the county, and Mr. J. W. White has generously allowed full use to be made of his excellent *Bristol Flora*.

A new Flora of Norfolk is in course of preparation. Mr. W. A. Nicholson, late Hon. Sec. of the Norfolk and Norwich Naturalists' Society, who has been accumulating materials for the purpose for some years past, is acting as editor. It will include articles dealing with the "History of Botanical Research in Norfolk," by the Editor; "Meteorology," by Mr. A. W. Preston, F.R.Met.Soc.; "Soils," by Mr. L. F. Newman, B.A., of the School of Agriculture, Cambridge; and "Physiography and Plant-Distribution," by Mr. W. H. Burrell, F.L.S. It is proposed to utilize as far as possible the work of the many students of the Flora of the county, both resident and non-resident, with a view to showing the progress that has been made in the detailed study of the local plants, and the changes, if any, that have occurred since the publications of Sir J. E. Smith, the Hookers, Rev. Kirby Trimmer, and others. The MS. is well advanced, and will, it is hoped, be ready for publication in the autumn.



P. Highley del. et lith

West, Newman imp.

Aridarum montanum *Ridley.*

SOME BORNEAN AROIDEÆ.

By H. N. Ridley, C.M.G., F.R.S.

(Plate 527.)

Aridarum, nov. gen.

Planta pusilla herbacea, foliis pluribus linearibus angustis coriaceis enervibus, marginibus et costa incrassatis. Scapus apud folia exortus brevior, gracilis. Spatha parva cylindrica rostrata. Spadix brevior cylindrica. Flores feminei circiter 16 ad basin, pistillis subglobosis, oblongis, stigmatibus discoideis; ovulis pluribus orthotropis. Flores masculi, stamina oblonga marginibus undulatis apicibus complanatis, canaliculatis. Flores steriles duo ad latera staminum adnati; basi breviter triangulares, apice longo setiformi.

Aridarum montanum, species unica. Herba parva, radicibus crassiusculis lanuginosis. Folia plura linearia acuminata basi angustata, coriacea, marginibus et costa incrassata, enervia, 12 cm. longa 4 mm. lata. Scapus gracilis bracteis 6 linearibus acuminatis papyraceis rufo-brunneis 3 cm. longis 3 mm. latis. Pedunculus 8 cm. longus. Spatha cylindrica abrupte rostrata 16 mm. longa. Spadix cylindrica obtusa brevior. Flores feminei ad 16, dissiti oblongo-subglobosi, stigmatibus discoideis aurantiacis medio depresso. Flores masculi elongato-oblongi, apice lato margine undulato,? canalicula in medio. Flores steriles basibus triangularibus apicibus setiformibus.

Sarawak, Santubong, *C. J. Brooks*.

This very remarkable little plant, of which there is only a single specimen in the collection, is allied to the section *Chamæcladon* of *Homalomena*. It differs generically from this genus in the linear coriaceous leaves, and in the peculiar structure of the male flowers. The stamens are longitudinally oblong, and have a rather deep longitudinal groove in the centre. From the sides of each stamen rises what is presumably a sterile flower, consisting of a minute triangular portion ending in a slender setiform process, which, in the specimen, lies horizontally over the top of the stamen. These processes are about half as long as the stamen. The base of this body is adnate to the lower part of the stamen. The occurrence of sterile flowers usually club-shaped is not infrequent in *Homalomena*, but they are almost invariably lateral to or among the female flowers, and never adnate to the male flowers nor of this peculiar shape. The inner face of the spathe and the stamens are sprinkled with small red purple dots apparently glandular.

The plant is obviously xerophytic, which is very unusual in the section to which it belongs. The mountain Santubong, on which it occurs, is at the apex distinctly xerophytic, and has at some period clearly been an outlying island. It has been visited by Beccari and several other botanists, but no one seems to have obtained this little Aroid previously.

I am indebted to Mr. N. E. Brown for assistance in working out the structure of this plant.

Arisæma microspadix Engler, Jahrb. xxxvii. 112.

Sarawak, *C. J. Brooks.*

This plant was described from specimens collected in Java by Zollinger, and is an addition to the flora of Borneo.

Piptospatha elongata N. E. Br. This Bornean plant was described by Engler (Bot. Jahrb. i. 183) under the name of *Rhynchopyle elongata.* N. E. Brown transferred it to his earlier genus *Piptospatha*, the type of which is *Piptospatha insignis*, also from Borneo. In 1910 (Bot. Mag. t. 8330) he described and figured under the name of *Gamogyne pulchra* a very pretty Borneo Aroid obtained by me in a pool at the foot of a cascade on Mt. Gading, near Lundu, in Borneo; I find, however, that this was the exact spot on which Beccari collected the plant later described by Engler as *Rhynchopyle elongata* (Beccari, Nella Foresti di Borneo, p. 168), and there is no doubt that *Gamogyne pulchra* and *Rhynchopyle elongata* are the same thing. *Rhynchopyle* and *Gamogyne* seem to be generically identical, and are distinguished from *Piptospatha* by their truncate stamens and crowded angular ovaries, *Piptospatha* having a prolonged connective to the anther and separated cylindric ovaries.

The Malay Peninsula plant described by me (Materials for Flora of Malay Peninsula, iii. 35) as *Piptospatha elongata*, and also by Hooker (Fl. Brit. Ind. vii. 539) under *Schismatoglottis elongata* Engler, is certainly distinct from the Borneo plant described by Engler as *Rhynchopyle elongata.* It differs in the broader, thinner foliage, smaller narrower white spathe, and truncate woolly-topped stamens.

Since writing the above Engler has published the part of the *Pflanzenreich* dealing with this genus. He retains the genus *Gamogyne* (for *G. Burbidgei* N. E. Br. only), and makes the Malay Peninsula plant a variety of *Piptospatha elongata* under the name var. *perakensis.* It is impossible to retain it as a variety of this species, so it will remain as *Rhynchopyle perakensis* Ridl.

Explanation of Plate 527.—*Aridarum montanum* Ridley. 1, plant natural size; 2, end of leaf and cross-section of same; 3, spathe cut open; 4, several male flowers viewed from above; 5, three views of a male flower with accompanying pair of sterile flowers; 6, two female flowers; 7, two ovules. Figs. 2–7 enlarged.

MAIANTHEMUM BIFOLIUM Schmidt IN ENGLAND.

By A. Bruce Jackson.

These observations on the occurrence and distribution of *Maianthemum* in England are the outcome of a visit paid last summer to Ken (or Caen) Wood, near Hampstead, where I was much interested to find it still flourishing in its *locus classicus.* For the purpose of establishing its claims as a native species in the south of England, as well as in its other localities in this country, I have brought together all records known to me.

It is undesirable to describe the Middlesex locality in detail, although, as the plant is in private grounds, it is in some way protected from extermination. On June 18th, 1912, Mr. H. B. Watt showed me a good-sized patch of the *Maianthemum* growing in a high open part of a wood, under a large beech-tree; it certainly has every appearance of being indigenous. The soil is a sandy loam with much humus. The dominant tree is *Quercus sessiliflora*; hornbeam, sycamore, mountain ash, holly, Scots pine, larch, and a few birches also occur, with two or three specimens of *Pyrus torminalis*. Mr. Tansley, who knows the spot, suggests that the beech may be native there; and he also considers that the *Maianthemum* may well be indigenous. The plants were mostly quite past flowering, but hardly any fruits were developing, indeed, nearly all the flowers had withered away and left only the pedicels remaining. Specimens sent to Dr. Trimen in August, 1866, by the then gardener, James Kay, are in the British Museum Herbarium: these are in a similar condition to those gathered last year. There are one or two fruits on each specimen, and about a dozen pedicels without fruits, and the gardener suggests that they may have been bitten off by birds or vermin.

The first notice of *Maianthemum* as a Hampstead plant is to be found in Park's *Topography and Natural History of Hampstead*, pp. 28–9 (1818), where Hunter mentions it as growing in the wood with *Convallaria maialis*, *C. verticillata*, and *C. Polygonatum*. The date of the record is 1813. Hunter was steward to Lord Mansfield, the owner of the estate.

In the volumes of the *Phytologist*, from 1843 onwards, there are notes on *Maianthemum* at Hampstead, which it will be well to summarize here.

In 1829 Irvine observed it at Hampstead (see Phyt. iv. 232, N.S. (1860)). The gardener, however, informed him that it was no new discovery, for that it had been known in that wood in two spots above fifty years. Its introduction was unknown. The lower patch had disappeared several years ago, and its disappearance was attributed to the alteration of a walk in the wood. The higher patch had considerably increased in 1852; the plant covered double the area it occupied in 1829. In 1852 the same patch of plants was seen by Mr. H. L. de la Chaumette, who remarked that he had observed it growing under almost exactly similar conditions in Switzerland (Phyt. iv. p. 519 (1852)).

In 1835 Edward Edwards, of Bexley, Kent, found several patches of *Maianthemum* in the same locality, "apparently well established and really wild, under the shade of fir-trees, near the higher parts of the wood" (Phyt. i. 579).

Mr. Borrer reports (*Phytologist*, ii. 432 (1846)) that he found the plant existing "in two large patches, one of them a circular one of seven paces in diameter, in a part of the park which is said to have been never cleared from the aboriginal forest. Opinion will vary as to whether it is indigenous or not."

In Bot. Gaz. i. 319 (1849), Henfrey makes the following remarks on the Middlesex locality:—" *C. bifolia* did undoubtedly grow at Caen Wood in 1840, for we possess a specimen gathered there at that period by Mr. R. S. Hill, in company with whom and Dr. F. J. Farr, we ourselves saw it growing. But it must be understood that Caen Wood is the name given to Lord Mansfield's grounds, long since enclosed and strictly private. None of our party had any idea but that the plant was naturalized. Although occurring plentifully in point of absolute number, it was confined to spots on which the plants grew thickly, as if spreading from a centre; and in all probability the plant was an outcast from a garden." The plant has since been collected in the locality by other botanists, as will be seen from the list of specimens given at the end of this paper.

County Records.

I now proceed to consider the conditions under which the plant has been found in other localities. The records are arranged in chronological order:—

Lancashire.—In Gerard's *Herbal*, 330 (1597), we have the earliest record of *Maianthemum* as an English plant. He gives a good figure of it, and says:—" Monophyllon groweth in Lancashire, in Dingley wood, sixe miles from Preston, in Aundernesse and in Harwood neere to Blackeburn, likewise. It flowreth in May and the fruite is ripe in September."

Bedfordshire.—In the early thirties Mr. Edwards saw the plant growing under fir-trees in Apsley Wood, Bedfordshire, but it does not seem to have been found there since, although the locality has been often visited by other botanists. Watson (Cyb. Brit. ii. 465) thought that Edwards had possibly mistaken some other plant for the *Maianthemum* both in Apsley Wood and at Hampstead, more especially as he wrote on the recollection of some years, but we know now that there was no doubt about where Edwards found the plant.

Northumberland.—Mr. R. Embleton, in Proc. Berwicksh. Nat. Club, ii. 20 (1843), writes:—" The Rev. Osd Head, of Howick, discovered it growing rather sparingly under the shade of a wide-spreading beech, in one of the woods at Howick." Mr, Borrer reports (*op. cit.* ii. 432 (1845)) that the plant had been extirpated at Howick. Watson (Cyb. Brit. ii. 465) observes that the Howick locality was close to Earl Grey's garden. I was unaware that the plant had been re-discovered in the county until the other day, when I found, at Kew, a specimen collected in Northumberland in June 1891. The specimen is accompanied by a letter from the Rev. T. R. Archer Hind, of Newton Abbot, who states that the plant was found growing in considerable quantity in a wild wood near the moors; a more detailed description of the place is wisely withheld. Many interesting plants, such as stone-bramble, *Vaccinia*, oak and beech ferns, and *Pyrola*, were found in the same neighbourhood. Prof. D. Oliver states (Journn. Bot.

1896, p. 431) that he was informed that it had been found near Rothbury, in central Northumberland, some years previously, by a Mr. Dinning. This locality may be the same as the one described by Mr. Hind.

YORKSHIRE.—In Borrer's herbarium at Kew there is a letter, dated 1860, accompanied by a specimen, from Mr. J. Breby to Borrer, describing the habitat of *Maianthemum* in its well-known station near Scarborough, where Breby and Reynolds discovered it in 1857. He describes the place as "about seven miles from Scarborough on the top and side of a precipitous cliff . . . in a beautiful valley lying between a continuation of the famed Forge Valley. The plant was growing in peat soil or clay (evidently never disturbed) shaded by low brushwood and oak trees, rather small and unthriving just in that locality, diffused around for several yards and down the cliff, reaching along the side from 50 to 100 yards and down the side about 20 yards. On the one side the steep cliff and on the other reclaimed moorland for a field or two, then the great unreclaimed moorland for miles. The only house near is a farmhouse in the valley several hundred yards below where the plant was found. I have made careful enquiry, and all tell me there never was a house near and the land was never cultivated. The plant was growing intermixed with *Trientalis europea*, *Habenaria bifolia*, and not far away were several ferns, *Lastræa Oreopteris*, *Polypodium*, *Phegopteris*, and *P. Dryopteris*, but such is the precipitous character of the cliff that all these may be found except *Trientalis*, and the *Maianthemum* not seen." Mr. J. A. Wheldon tells me that he was very familiar with the Scarborough station in the late seventies and early eighties and saw the May Lily there in 1887. He says it is most plentiful near the upper edge of the escarpment, which is considerably under 1000 ft. altitude, he thinks, but extends down into the wood in scattered patches for about 50 or 60 ft. and longitudinally for perhaps 100 to 150 yards. He thinks the local botanists regarded it as truly native. He points out, however, that there are planted trees in the wood, although a great deal of it is no doubt aboriginal. His only difficulty in accepting the species as native there is its restricted range in a situation where there are miles of suitable stations for it. It does not occur in any of the other dales in the vicinity which cut deeply into the great limestone mass and are very similar in their vegetation to that of Forge Valley, and in Forge Valley itself it is restricted to this one patch. It spreads chiefly by the root, as in some seasons it flowers very sparingly. This would look as if it had spread in this locality from one central focus. He would feel more satisfied that it was native if it occurred in several distant parts of Forge Valley or in some of the adjacent similar dales. In the seasons when it flowered freely the blossoms were hawked in small bunches in Scarborough as "May Lilies," and he has seen fine baskets full of blooms being carried from door to door by itinerant vendors, who knew it was considered a rarity. I am informed that the *Maianthemum* still exists in its Scarborough locality, and I have therefore purposely refrained from describing its whereabouts in detail.

Lincolnshire.—The Rev. E. Adrian Woodruffe-Peacock sends me the following interesting note:—"*Maianthemum bifolium* was first discovered in Lincolnshire at Turnby in 1895 by Miss Rawnsley. It had certainly been there for seventy years. It is an open oak wood on rather peaty soil. The rock is old river gravel. It is a plant of the *Hypnum* peats. The old river gravel is about one-third Lincolnshire limestone. *M. bifolium* is found with us in Turnby Wood only. I think it is a late-comer like *Iris spuria.* We know that it has been on the estuarine alluvium a hundred years, yet it was only discovered by the late B. M. Burton in 1894. If I remember rightly, it requires limestone water, half shade, full shelter, and fair moisture. In my terminology it is a 'local areal.' By means unknown to us it has gained a position in which it can survive and spread for a certain local area. *Vicia sylvatica* is a local areal and native. *Galanthus* is a local areal and alien: but I fancy *Maianthemum* does not belong to a list with it; you can safely put it with *V. sylvatica* for the present, along with *Corydalis claviculata.*"

Durham.—In the late summer of 1896 Prof. D. Oliver found the May Lily in Durham, and records its occurrence in Journ. Bot. 1896, 451. He says:—"I came upon a large patch of the plant—say twenty to thirty feet in extent—in a plantation on a steepish bank near the Derwent under Hunstanworth, on the Durham side of the river. It is just the habitat for it as I remember the plant in Norway, so far as I can judge. The trees about are spruce, larch, oak, birch; the general undergrowth of the plantation *Luzula sylvatica, Oxalis, Geranium sylvaticum,* with male, shield, and oak ferns. The deciduous trees of the plantation not immediately near, besides the above, are sycamore, beech, and mountain ash—no trace of gardener's work, as *Vinca,* rhododendron, and such like. I do not see why it should not be a genuine station. My friend Mr. Howse, of Newcastle Museum, informs me that a station for the plant near Blanchland—I think probably the place in which I found it—is known to the Rev. Mr. Dunn of that village."

Oxfordshire. — Some years ago Mr. Druce was shown a specimen of *Maianthemum* which was said to have been gathered by a young man in Thame Park, in a hedgerow between Thame and Wheatley, but though Mr. Druce has carefully searched the locality many times since, he has never been able to find it there.

The plant is a native of the temperate regions of the northern hemisphere and is found throughout Europe with the exception of the Mediterranean region; its Continental distribution is entirely in favour of its being considered a native species in the South of England. Nyman gives its distribution as England, North, Central and West France, Belgium, Holland, Germany, Switzerland, N. Italy, Austro-Hungary, Slavonia, Moldavia, Croatia, Bosnia, and Russia. In Belgium it is found in the provinces of

Antwerp, Brabant, and Limbourg. I saw it in a fir wood on the south-east slope of Mount Pilatus, in Switzerland, some years ago, and also in woods near Lucerne, growing under similar conditions to the Hampstead locality. It is also found in N. China, Korea, Japan, and is plentiful in the Northern United States.

SUMMARY.

The foregoing observations show that *Maianthemum* occurs in at least five English counties under similar naturally ecological conditions. Moreover, the Middlesex locality does not differ in such a way from the other stations as to make it likely that the plant was introduced there. If the localities are compared it will be found that they have much in common. Another point in favour of its being indigenous, that the wood at Hampstead where it grows is believed to be one of the few natural woods still existing in Middlesex. I do not attach much importance to the fact that *Anemone apennina*, an introduced species, is found in the same woods or that the locality is in private grounds, though of course these are points against its nativity.*

De Candolle (Geogr. Bot. 696, 1855) has the following note on the status of this species in England:—" On a émis des doutes soit sur la présence soit sur l'origine de cette espèce dans la Grande-Bretagne (Bab. Man. 2 edit. p. 324; Wats. Cyb. ii. p. 465; iii. p. 514). Cependant d'après les citations mêmes de ces auteurs, Gerarde l'indiquait comme spontanée dans deux localités et de nos jours on l'a retrouvée çà et là après avoir effacé l'espèce des Flores anglaises. Elle abonde dans la péninsule scandinave et in Allemagne jusque dans la partie occidentale; elle existe dans le nord de la France, par conséquent aucune raison géographique ne peut fair soupçonnér une exclusion de la Grande-Bretagne. Loin d'être naturalisée elle semble avoir existé jadis plus fréquemment et avoir diminué avec les forêts."

The view that the May Lily was formerly much commoner than at present but has decreased with the woods is suggested by Parkinson, who says (Theatr. Bot. 505 (1640)):—" It groweth in moist shadowie and grassie places of woods in many places of the Realme."

I have seen the following British specimens:—

MIDDLESEX.—Hampstead: Coll. A. Irvine, without date (*Herb. J. S. Mill, Kew*); W. Borrer, 1845 (*Herb. Borrer, Kew*); J. B. Syme, May, 1852 (*Herb. Watson, Kew*, and *Herb. Mus. Brit.*); *Herb. Maude*, 1853; W. Thiselton-Dyer, 1863 (*Herb. Kew*); H. Trimen, May 21, 1863, and May 22, 1866 (*Herb. Mus. Brit.*); James Kay, August, 1866 (*Herb. Mus. Brit.*).

N.E. YORKS.—Scarborough: Coll. J. Breby, 1860 (*Herb. Borrer*); P. Reynolds, June, 1861; Wilkinson, June, 1866;

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* In Dr. Trimen's interleaved copy of the *Flora of Middlesex* in the British Museum Herbarium, there is a MS. note suggesting that it may have been introduced by the Earl of Bute, of whom Lord Mansfield (then Solicitor-General) bought the estate in 1755.

J. Ward, June 15, 1867 (*Herb. Watson*); Cornelius Fox, June, 1871 (*Herb. Mus. Brit.*).

Northumberland.—Comm. T. Archer-Hind, 1891 (*Herb. Kew*).

Durham.—Hunstanworth: Coll. D. Oliver, September, 1896 (*Herb. Kew* and *Herb. Mus. Brit.*).

N. Lincoln.—Turnby Wood: Coll. Rev. E. A. Woodruffe-Peacock, 1896.

ALABASTRA DIVERSA.—Part XXIII.

By Spencer le M. Moore, B.Sc., F.L.S.*

(Continued from p. 188.)

For the two descriptions immediately following I am indebted to Mr. H. F. Wernham.

Fadogia Rogersii Wernham, sp. nov. Frutex ramulis gracilibus mox cortice cinereo glabro indutis novellis dense albo-lanatis; *foliis* parvis ad ca. 3 cm. × 1·3 cm. apice rotundatis basi acutis, supra araneosis subtus densissime lanugine alba indutis, petiolo brevissimo; *cymis* 2–3-floris, sessilibus, floribus extus omnino albo-arachnoideo-lanatis; *calycis* limbo truncato dentibus obsoletis; *corollæ* tubo ampliusculo insuper parum dilatato 1·8 cm. longo curvato, lobis lanceolatis ad ca. 5 mm. longis.

Congo: Elisabethville, 4800 ft., *Rogers*, 10,221

Distinct in the small leaves, dark-green and cottony above and woolly below, and the large white flowers clothed with silky wool.

Rogers, 10,396, from the Belgian Congo, is identical with *Fadogia stigmatoloba* K. Sch., based on *Goetze*, 1428, from Nyasaland.

Cephaëlis australis Wernham, sp. nov. Glaberrimus, ramulis validis superioribus compressis v. quadrangularibus; *foliis* superioribus lanceolatis ca. 10 cm. × 3 cm. utrinque angustatis, senioribus majusculis 20 cm. × 10 cm. ovalibus basi cuneatis apice breviter acuminatis, petiolo valido qua vena subtus prominens centralis albido 2–3 cm. longo, venis secundariis utrinque ca. 15, *stipulis* membranaceis late ovatis v. oblongis ca. 2·3 cm. × 1·5 cm. acuminatis ad medium v. altius bifidis, mox caducis; *capitulis* paucis, pedunculo vix 1·5 cm. longo, ca. 2 cm. diam., bracteis involucrantibus majusculis ovatis flores 5–6-meris occludentibus; *ovario* 2–3-loculari.

S. Congo: Lufira, sixty miles north of Elisabethville, *Rogers*, 10,304

The nearest affinity seems to be *C. peduncularis* Salisb., readily distinguished by the long peduncles and exposed flowers.

Helichysum (Chysolepidea § Stæchadina) **squamosifolium,** sp. nov. Caule sat tenui semispithameo erecto albo-araneoso-tomentoso, foliis radicalibus desunt, caulinis paucis bracteiformibus sessilibus oblongis obtusis supra fere glabris subtus margineque

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* The types of the plants described are in the National Herbarium.

araneoso-tomentosis, capitulis homogamis circa 10-flosculosis in corymbum pluricephalum subdensum araneoso-tomentosum dispositis, involucri turbinati 4-serialis phyllis oblongis exterioribus dorso araneoso-tomentosis interioribus appendice oblongo-ovata obtusa vel acuta læte flava haud radiante onustis, corollis inclusis breviter lobatis, antherarum caudis abbreviatis, achæniis cylindricis pubescentibus, pappi setis pluribus corollis fere æquilongis ima basi connatis scabriusculis sordide albis.

Hab. Congo, Kamatanda; *Rogers*, 10,331.

Folia caulina circa 15 × 3 mm., cauli subapproximata inferneque eundem leviter amplectantia. Corymbi 1–2 × 2·5–3 cm., hujus rami abbreviati; pedunculi proprii 0–3 mm. long. Capitula circa 8 × 5 mm. Involucri phylla ext. 5–5·5 × 1–1·25 mm., int. 7 × 2 mm. Corollæ 5 mm. long.; lobi triangulares, longit. ·5 mm. ægre adæquans. Antherarum caudæ simplices, ·3 mm. long. Achænia 1·5 mm. long., pappus 4·5 mm.

Very close to *H. congolanum* Schlechter & O. Hoffm., from which it differs chiefly in the somewhat smaller heads, shorter involucral leaves, the inner ones ending in a bright yellow (not a horn-coloured) appendage, the very short lobes to the corolla and short tails to the anthers.

Gnaphalium araneosum, sp. nov. Annuum, parvulum, a basi ramosum ramis ascendentibus attenuatis foliosis araneosis, foliis sessilibus anguste lineari-spathulatis obtusis araneosis, capitulis ultra 50-flosculosis in glomerulos densos oligocephalos araneosos ordinatis, involucri parvi 4-serialis phyllis ext. ovatis obtusis interioribus longioribus ovato-oblongis appendice oblongo-lineari obtusissima deorsum rosea sursum dilute brunnea onustis, flosculis intimis 4–8 hermaphroditis, corollis apice breviter 5-lobis, styli ramis truncato-capitatis, achæniis cylindricis glabris, pappi setis scabriusculis albis.

Hab. N.W. Rhodesia, Lake Chirengwa, with *Helichysum angustifrondeum*; *Rogers*, 8406, in part.

Planta 1-3 cm. alt. Folia circa 5 × ·5 mm., summa more involucri capitula stipantia. Glomeruli 8–12 mm. diam. Capitula 3·5 × 3 mm. Involucri phylla ext. 3 mm. int. 3·5 mm. long. Flosculi fem. pro capitulo circa 50. Fll. hermaph. corollæ 2 mm. long.; hujus lobi ·2 mm. long. Achænia ·6 mm. long., pappus 2 mm.

G. prostratum DC., to which this comes nearest, has different foliage and involucral appendages. The linear-oblong, very obtuse, pale brown appendages to the involucral leaves are a characteristic feature of the species.

2. ACANTHACEÆ AFRICANÆ NOVÆ VEL RARIORES.

Thunbergia (§ EU-THUNBERGIA) **Monroi**, sp. nov. Frutex scandens ramis crebro foliosis hirtulo-pubescentibus, foliis parvis petiolatis cordatis obtusissimis margine undulatis raro obscurissime trilobis quinquenerviis membranaceis supra scabridis subtus scabride pubescentibus, floribus in axillis solitariis pedunculis pubescentibus folia plane excedentibus fultis, bracteolis ovato-oblongis acutiusculis inconspicue quinquenerviis hirtulo-pubescentibus, corollæ glabræ tubo bracteolas excedente ad 3 mm. supra basin leviter contracto superne subcylindraceo limbo quam tubus breviore, antherarum connectivo haud producto loculis barbatis basi sat longe productis calcaratisque, stigmatis lobo infero late deltoideo.

Hab. Rhodesia, Victoria; *C. F. H. Monro*, 652 A, 653.

Foliorum lamina 2·5–4 × 2–3·5 cm.; petioli sæpissime 1–2 cm. long. Pedunculi 5–8 cm. long. Bracteolæ 17 × 6 mm. Calycis dentes 1·25–2·5 mm. long. Corolla in toto 3 cm. long.; tubus 2 cm. long., ima basi 3 mm., paullo supra basin 2·5 mm., superne 7–8·5 mm. diam.; lobi late obovati, 1 cm. long. Antherarum loculi 3 mm. long. Stigmatis lobus inferus 1·5 × 2 mm., superus 2·75 mm. long. Capsula 2 cm. long., pars seminifera 5–6 × 8 mm., rostrum 3·5 mm. lat. Semina scaphæformia, verrucosa rugataque, pallide brunnea, 4 × 2·5 mm.

From *T. alata* Boj. and its allies this is easily recognized by its indumentum and foliage.

The corollas of the specimens are in a rather unsatisfactory state, so that one stamen only was dissected out uninjured from the flower examined.

Thunbergia (§ THUNBERGIOPSIS) **Kassneri**, sp. nov. Caule herbaceo ascendente ramoso ut rami folioso quadrangulari sparsim pubescente cito bifariatim puberulo, foliis sessilibus oblongo-oblanceolatis obtusis basi rotundatis vix amplexicaulibus uninervibus firme membranaceis utrinque scabriusculis, floribus in axillis solitariis pedunculis quam bracteolæ longioribus insidentibus, bracteolis inter se liberis late ovatis obtusiusculis 5-nervibus reticulato-nervosis scabriusculis, calycis dentibus abbreviatis deltoideis, corollæ mediocris tubo bracteolas facile excedente superne dilatato lobis suborbicularibus tubo manifeste brevioribus, stigmate ad angulos barbato.

Hab. South Congo, Bamva, M. Kubwa; *Kassner*, 2280.

Folia solemniter 3·5–5·5 cm. long., 8–13 mm. lat. Pedunculi circa 2·5 mm. long., puberuli. Bracteolæ 14 × 9 mm. Calyx 1 mm. long. Corollæ tubus 25 mm. long., inferne 4·5 mm. superne 7 mm. lat.; lobi 10 × 12 mm. Ovarium 2 mm. long. Stylus 13 mm. long.; stigma 7 mm. long., ore 5 mm. diam.

Two stamens only, and those not in good condition, were seen, the others having apparently been devoured by some insect. One of the stamens has both of its anthers (which are 3 mm. long) spurred at the base, and the connective produced at its apex, the other has not a produced connective, and the cells of the anther appear to be only bearded at the base.

Differs from *T. lancifolia* T. And., *inter alia*, in the smaller leaves, the much smaller and relatively broader bracts, and the narrower tube of the corolla.

Thunbergia (§ THUNBERGIOPSIS) **valida**, sp. nov. Erecta caule valido ramoso striato angulatoque ut rami subtiliter pubescente, foliis sessilibus obovatis vel obovato-oblongis obtusissimis vel obtusis nonnunquam apiculatis basi angustatis uninervibus membranaceis supra scabriusculis subtus velutino-pubescentibus, floribus in axillis solitariis pedunculis velutinis quam bracteolæ brevioribus insidentibus, bracteolis ovatis obtusissimis basi levissime cordatis 5-nervibus, calycis pubescentis lobis brevibus deltoideis, corollæ mediocris tubo bracteolas facile excedente paullo supra basin contracto inde gradatim ampliato lobis quam tubus multo brevioribus, antherarum connectivo producto loculo altero basi incurvo-calcarato altero barbato, stylo glabro.

Hab. N.W. Rhodesia, near Malangushi River, under trees; *Kassner*, 2038 A.

Rhizoma circa 8 mm. diam., fibras paucas validas sparsissime fibrillosas 5–8 mm. diam. emittens. Folia pleraque 6–8 × 3–3·5 cm. Pedicelli circa 1 cm. long. Bracteolæ summum 2·3 × 1·7 cm., sublaxe reticulato-nervosæ. Calyx 2 mm. long. Corolla 4·8 cm. long.; tubus 3·8 cm. long., ima basi 4 mm., paullulum supra basin 2·5 mm., faucibus circa 2 cm. lat.; lobi suborbiculares, 1 cm. long. Antheræ fere 3 mm. long. Discus valde incrassatus, 1·5 mm. alt. Ovarium 2·5 mm. long. Stylus compressus, 14 mm. long.; stigma 9 mm. long., ad angulos barbatum.

T. angolensis S. Moore, the species to which this seems nearest, has a different indumentum, as well as foliage and bracteoles not at all like. The flowers have a deep violet limb and much yellow in the tube.

Synnema (§ Eu-Synnema) **limnophiloides**, sp. nov. Planta aquatica glabra, caule repente submerso folioso hac atque illac ramulos breves ascendentes florigeros ad apicem usque foliosos gignentibus, foliis submersis oppositis multisectis segmentis filiformibus, foliis normalibus parvis sessilibus oblongo-ovatis obtusis inferioribus nonnunquam pinnatifidis vel saltem margine dentatis reliquis integerrimis firme membranaceis, floribus in axillis superioribus solitariis subsessilibus, bracteolis dummodo exstent lineari-oblongis obtusis calyce brevioribus, calycis segmentis inter se subæqualibus lineari-lanceolatis obtusis glabris vel hispidulo-ciliatis, corollæ tubo calyce paullo breviore cylindrico (faucibus levissime ampliato) labio postico usque ad medium lobato labii antici lobis oblongo-quadratis emarginatis, antheris subinclusis, ovario oblongo-ovoideo obtuso, stylo exserto, ovulis pro loculo 4–5.

Hab. Angola, Cuito River at Capunda; *Gossweiler*, 3043.

Caulis fistulosus, ad nodos levissime constrictus, 2·5 mm. diam.; ramuli 6 cm. alt. vel minus. Folia submersa summum 2·5 cm. long., sed sæpe breviora. Folia normalia approximata, ± 8 × 3·5 mm. Bracteolæ 2·5 mm. long. Flores verisimiliter albi vel lutei. Calycis segmenta 6 mm. long. Corollæ tubus 5 mm. long.; labium posticum quadrato-oblongum, 4 × 3 mm.; labium anticum late obovatum, 4·5 × 4 mm.; hujus lobi 2 × 1·75 mm. Filamenta per paria connata; antheræ oblongæ, longit. 1 mm. paullulum excedentes. Ovarium 2 mm. long; stylus 7·5 mm. long.

This is a very remarkable plant on account of its finely divided submerged leaves, which render it, so far as I am aware, unique

among *Acanthaceæ*. Indeed, except for a few genera, such as *Acanthus*, *Blepharis*, *Mellera*, and *Brillantaisia*, entire or at most slightly undulate leaves are the rule throughout the order. A few Indian species of *Synnema* with the lower leaves, very rarely all, pinnatifid are also exceptional in this respect; but in none of these does the division approach the fineness characteristic of the species under notice. Before examination, *S. limnophiloides* would be sorted unhesitatingly into the *Scrophulariaceæ*, as actually occurred at the Museum.

One specimen dissected bore but a single flower (in the penultimate axil), and this had no bracteoles.

Dyschoriste decora, sp. nov. Ramis subteretibus pubescentibus cito puberulis ad nodos sæpe ramuliferis, foliis subsessilibus ovato-oblongis obtusis vel obtuse acutis basi cuneatis tenuiter coriaceis supra glabris subtus in nervis puberulis, floribus mediocribus in cymis axillaribus densis plurifloris dispositis, bracteolis anguste lineari-lanceolatis acutis calycem circiter semiæquantibus ut calyx piloso-hirtulis, calycis segmentis ima basi solummodo connatis anguste lineari-lanceolatis longe acuminatis, corollæ tubo ex calycis tubo breviter eminente superne inflato limbo bilabiato (lobis posticis sat alte connatis), antherarum loculis basi calcaratis, stylo puberulo.

Hab. Congo, Kasomena, under trees; *Kassner*, 2563.

Folia solemniter 3·5–4·5 × 1·5–2 cm., margine nonnunquam subtiliter denticulata, subtus pallidiora ibique costas laterales magis aspectabiles ostendentia. Folia floralia ceteris similia sed minora. Bracteolæ 9 × 12 mm. Flores purpurei. Calyx 16·5 mm. long.; segmenta summum 1·5 mm. lat. Corollæ tubus extus puberulus, 18 mm. long., dimidio inf. 2 mm. lat., sursum adusque 8·5 mm. dilatatus; palatus mediocriter prominens; labium posticum 8 × 6·5 mm., hujus lobi 3·5 mm. long.; labium anticum 9·5 × 10 mm., lobi 6 mm. long. Antheræ subinclusæ, 1·25 mm. long. Ovarium 2 mm., stylus 21 mm. long.

D. trichocalyx Lindau has shorter calyx-segments united one-third of the way up, a character affording an easy distinction from *D. decora*. The almost free calyx-segments are exceptional for the genus.

Disperma scabridum, sp. nov. Frutex fere orgyalis caulibus pluribus sat validis ascendentibus vel sæpe procumbentibus, ramulis omnimodo foliosis pilis hispidis (glandulosis intermixtis) crebro obsitis, foliis sessilibus ovato-oblongis junioribus oblongis in folia floralia transeuntibus acutis basi cordatis margine apicem versus denticulatis coriaceis utrinque scabridis, floribus in axillis pluribus summis solitariis, foliis floralibus ovato-oblongis ovatisve ut inflorescentiæ axis et bracteolæ et calyx copiose glanduloso-hispidis, bracteolis oblongo-obovatis acutis calyce paullulum brevioribus, calycis segmentis ad medium usque (anticis minus alte) connatis lineari-lanceolatis acutis, corollæ tubo subcylindrico calyci æquilongo lobis oblongo-obovatis obtusissimis, staminibus subinclusis, ovulis in loculis solitariis.

Hab. Angola, between Old Menongue and N'jaio; *Gossweiler*, 4140.

Folia pleraque 3–6 cm. long., 1·5–2 (raro 2·5) cm. lat., summa circa 15 × 8 mm., in sicco griseo-olivacea. Bracteæ ± 11 × 6 mm. Bracteolæ 9–10 × 5 mm. Calyx 10 mm. long. Corollæ tubus extus superne puberulus, 11 mm. long., basi 2·5 mm. faucibus 4 mm. lat.; labia 6 mm. long., horum lobi 3·5 mm. Antheræ 2 mm. long. Ovarium glabrum, 2 mm. long. Stylus puberulus, 8·5 mm. long.

From *D. dentatum* C. B. Clarke this can be told on sight by the sessile leaves and the broad bracteoles.

Gossweiler's No. 3954, gathered on rocky ground near Menongue, is to be referred here. The leaves are entire, or at most repand, and the bracteoles narrower (11 × 2·5 mm.) but otherwise I can see no difference.

STROBILANTHOPSIS GLUTINIFOLIA S. Moore.

Congo, near Sakania; *Rogers*, 10,021.

Blepharis Kassneri, sp. nov. Suffrutex erectus gracilis sesqui-bispithameus, ramulis ascendentibus vel ascendenti-patulis attenuatis sparsim foliosis patule pubescentibus, foliis verticillatis paris alterius altero multo brevioribus omnibus linearibus vel anguste lineari-lanceolatis acutis obtusisve integris coriaceis utrobique scabridis, floribus sub apice ramulorum sat elongatorum verticilloque foliorum stipatis solitariis, bracteis circa 7 interioribus gradatim majoribus cymbiformibus lanceolatis acuminatis integris longitrorsum nervosis firme scariosis, bracteolis 0, calycis (ut bracteæ) glabri segmento antico 4-nervi lanceolato apice bilobo lobis angustissime lineari-lanceolatis acutis segmento postico anguste ovato-oblongo obtuso segmentis lateralibus oblongo-lanceolatis acutis quam segmentum anticum plane breviore, corollæ tubo late subcylindrico ipso sub limbo dilatato limbo oblongo-obovato tridentato, antheris majoribus latere minoribus solummodo juxta medium barbatis, ovulis quove in loculo unicis.

Hab. South Congo, Mazila; *Kassner*, 3003.

Caulis aliquanto anfractuosus, 1 mm. diam. vel paullulum ultra; internodia plerumque 5–8 cm. long. Folia majora 5–8 cm. long., 6-7 mm. lat.; minora 13–20 × 2-3 mm., omnia pallidissime nitentia necnon margine in nervisque pilosa. Inflorescentia pansa 27 × 9–10 mm. Bracteæ extimæ 6 mm. long.; intermediæ 9 mm., intimæ 13 mm. long., omnes ut calycis segmentum posticum lineis rubris percursæ. Calycis segmentum anticum 17 mm. long., hujus lobi 2·5 mm. long.; segmentum posticum 27 mm. long., segmenta lateralia 11 mm. Corollæ tubus antice atque postice barbatus, 3 × 3·5 mm.; limbus verisimiliter albus vel luteus, pubescens, intus prominenter 3-carinatus, 27 mm. long. Filamenta 8 mm. long.; staminum anticorum antheræ 5·5 mm. long., posticorum 4·5 mm., illorum antheræ loculi vestigium 5 mm. long. Ovarium anguste ovoideum, 2 mm. long.; stylus glaber, 11 mm. long.

Very near *B. glumacea* S. Moore, of which in habit and foliage it is the counterpart; the longer acuminate striated (not blotched) bracts enable one to distinguish *B. Kassneri* without difficulty.

Crossandra pinguior, sp. nov. Suffruticosa, circiter spithamea, fere a basi ramosa, ramis pubescentibus cito glabrescentibus, foliis sessilibus obovato-oblongis obtusis nisi obtusissimis basi longe attenuatis ita petiolum alatum simulantibus firme membranaceis utrinque scabriusculis necnon in nervis pubescentibus, spicis anguste ovato-oblongis plurifloris pedunculis validis sat elongatis pubescentibus insidentibus, bracteis oblongo-ovatis acuminatis integris longitrorsum pluristriatis papyraceis subtiliter puberulis, bracteolis oblongo-obovatis breviter aristulatis bracteas circiter semiæquantibus, calycis segmento postico integro ovato-oblongo breviter aristulato nervo unico centrali percurso quam antica longius aristulata paullulum breviore segmentis lateralibus anticis similibus nisi paullo brevioribus, corollæ tubo bracteis æquilongo superne leviter ampliato extus (triente inf. glabra exempta) pubescente limbi lobis posticis quam ceteri minoribus, staminibus supra medium tubum insertis.

Hab. Congo?, N'Yenyeshi River, between trees; *Kassner*, 2225.

Folia (adjecta parte petioliforme) summum 18 cm. long. et 5 cm. lat., sed plerumque minora. Pedunculi 8–10 cm. long. Spicæ ± 6 × 2 cm. Bracteæ circa 25 mm. long., 10–11 mm. lat. Bracteolæ 14 mm. long., juxta medium 5 mm. lat. Calycis segmentum posticum 12 mm., segmenta antica 13 mm., lateralia 10 mm. long. Corollæ tubus 25 mm. long., faucibus 3 mm. diam.; limbus 18 × 22 mm., hujus lobi postici 3 mm., reliqui 6 mm. long. Stamina ad 6 mm. infra corollæ os inserta; antheræ 2·25 mm. long. Ovarium 4 mm., stylus 14 mm. long.

Distinguishable on sight from *C. puberula* Klotzsch by reason of the broader spikes with differently shaped bracts. The entire 1-nerved hinder segment of the calyx is another of the peculiar features.

Crossandra Warneckii, sp. nov. Planta ± spithamea caule ascendente paucifolioso dense ferrugineo-velutino, foliis petiolatis ovato-oblongis obtusissimis basi cordatis margine undulatis firme membranaceis supra pilis albis appressis sparsim præditis subtus præsertim in nervis pubescentibus, spicis folia excedentibus linearibus plurifloris floribus saltem inferioribus subdistantibus, bracteis pro rata parvulis lanceolatis longe acuminatis ut bracteolæ sibi ipsis similes nisi minores calycisque segmenta papyraceis glabrisque, calycis bracteas circiter æquantis segmentis inter se subæqualibus (lateralibus paullulum angustioribus) anguste oblongo-lanceolatis acuminatis segmento postico integro uninervi, corollæ tubo calycem facile superante subcylindrico (basi leviter ampliato) glabro lobis oblongo-obovatis quam tubus multo brevioribus, staminibus ad 5 mm. infra corollæ os affixis.

Hab. German East Africa, Amani; *Warnecke*, 230.

Folia pleraque 5–6·5 × 2·5–3 cm., in sicco olivaceo-grisea; petioli 1–3 cm. long., dense velutini. Spica summum longit. 10 cm. excedens, hujus internodia profecto evoluta 1 cm. long. Bracteæ 7 mm. long., basi ægre 3 mm. lat.; bracteolæ 6 × 1·5 mm. Calycis segmenta lateralia 7·5 × 1 mm., reliqua 8 × 1·5 mm. Corollæ tubus 12 mm. long., basi 2 mm. superne 1·75 mm. lat.;

lobi 5 × 3 mm. Antheræ curvatæ, fere 2 mm. long. Ovarium 2·5 mm., stylus 13 mm. long.

By an obvious oversight this has been distributed as *C. guineensis* Nees. The small bracts are peculiar, and remind one of the Madagascar genus *Stenandriopsis*, which, however, has different pollen, that of *C. Warneckii* being quite normal for *Crossandra*. Like the species just described, this has an entire 1-nerved hinder segment of the calyx, a rare occurrence in the genus.

C. PRIMULOIDES Lindau (ex descript.).

Angola, in the shade of trees near Sange; *Gossweiler*, 4468.

NEURACANTHUS DECORUS S. Moore.

Angola, Kuelai, Masaca; *Gossweiler*, 2894, 3074. Congo, Shuvele, under trees; *Kassner*, 2482.

N. GRACILIOR S. Moore.

Angola, in woods on the Kuebe near Munongue; *Gossweiler*, 3101, 3579.

"Bracts dusky purplish. Flowers violet white, opening only in the morning."

Lepidagathis (§ NEURACANTHOPSIS) **sciaphila,** sp. nov. Caule bispithameo erecto folioso ramulos breves hac atque illac emittente tomento fulvo obducto, foliis brevipetiolatis ovatis sæpius ovato-oblongis basi apiceque obtusis utrinque sed præsertim pag. inf. pilis stellatis fulvis inspersis, cymis caulem ita ramulos summos perpaucos terminantibus ambitu ovatis vel ovato-oblongis dense multifloris, bracteis bracteolisque scariosis dorso superne villosulis illis ovato-lanceolatis sat longe acuminatis quam hæ lanceolatæ longiusque acuminatæ brevioribus, calycis scariosi villosuli segmentis longe et rigidiuscule acuminatis nequaquam spinosis seg. postico ovato-oblongo segmentis anticis lineari-lanceolatis quam lateralia linearia paullo longioribus, corollæ tubo calycem superante deorsum cylindrico faucibus leviter constricto ore dilatato labii antici lobis oblongis obtusissimis intermedio quam laterales minore labio postico antico æquilongo late oblongo apice truncato, antheris posticis 1-locularibus, stylo exserto, ovulis pro loculo 2.

Hab. Belgian Congo, W. Kundelungu, under trees; *Kassner*, 2800. Tanganyika, Uvira; *id.*, 3070.

Folia pleraque 4–6·5 cm. long., 1·3–3 cm. lat., exstant vero minora; petioli ± 4 mm. long., fulvo-tomentosi. Cymæ 2–4·5 × 1·5–3·5 cm. Bracteæ 10 mm. long., bracteolæ 12 mm. Calycis segmentum posticum 13 × 3 mm.; segmenta antica 11·5 × 1·5 mm., lateralia 9 × ·75 mm. Corollæ tubus 14 mm. long., inferne 2 mm. faucibus ægre 5 mm. lat.; labia extus piloso-villosula; labium anticum 8 mm. long., hujus lobi laterales 5·5 × 2·75 mm., lobus intermedius 5 × 2 mm.; labium posticum 4 mm. lat. Antheræ 1·5 mm. long. Ovarium fere 2 mm. long., disco maxime prominente circumdatum. Stylus puberulus, 23 mm. long.

To be inserted in the genus next to *L. laguroidea* T. And., but

quite different from it in the indumentum and in the cymes. In general appearance it greatly resembles the Indian *L. hyalina* Nees.

L. Lindaviana Buscalioni & Muschler in Engl. Jahrb. xlix. 494 (1913) = *L. nemorosa* S. Moore in Journ. Bot. 1910, p. 253.

Justicia andongensis C. B. Clarke.

Angola, common in thickets about the Forte Princeza Amelia and elsewhere; *Gossweiler*, 2394.

Justicia (§ Calophanoides) **umbratilis**, sp. nov. Suffrutex ramosus caule ramulisque foliosis quadrangularibus scabriusculis, foliis breviter petiolatis lanceolatis obtusis basi obtusissimis membranaceis utrobique scabridis, floribus in axillis superioribus (vetustioribus satis distantibus junioribus approximatis) 2–3-nis, bracteis calycem paullo excedentibus oblongo-ovatis obtusis sparsim hispidulis, bracteolis minutis, calycis segmentis 5 lineari-lanceolatis longe acuminatis hispidulis, corollæ extus puberulæ tubo calycem leviter excedente sursum paullulum amplificato labio antico tubo paullo longiore suborbiculari 3-lobo lobo intermedio quam laterales multo latiore labio postico ovato-oblongo apice bidentato, staminibus exsertis, capsula 4-sperma glabra.

Hab. Lake Moero, Lukongolava, under trees; *Kassner*, 2804.

Folia usque ad 3–8 × 1·3 cm., sed pleraque ± 20 × 8 mm., in sicco griseo-olivacea. Bracteæ circa 6–7 × 2·5–3 mm. Bracteolæ subulatæ, 1 mm. long. vel paullo ultra. Calycis segmenta 5·5 mm. long. Corollæ tubus 6·5 mm. long., inferne 2 mm. faucibus 3·5 mm. lat.; labium anticum 7·5 × 6·5 mm., hujus lobus intermedius 1·5 × 2·75 mm., lobi laterales 1·5 × 1·25 mm.; palatus optime prominens; labium posticum 6·5 × 2·5 mm. Filamenta 4·5 mm. long; antherarum loculus sup. basi obtusus, 1·25 mm. long., loc. inf. (calcare incurvo incluso) fere 2 mm. Ovarium 1·5 mm., stylus 7 mm. long., hic deorsum pilosus. Capsula oblongo-ovoidea, apice subito acutata, 8 mm. long. Semina parvula, plano-compressa, subtiliter tuberculata, dilutissime brunnea, diam. 1 mm. leviter excedentia.

Differs from *J. Galeopsis* T. And., with which the alliance seems closest, in several respects, *e. g.* the scabrous foliage, the broad bracts, narrower more lengthily acuminate segments of the calyx and smaller apparently white (or yellow) corollas.

J. Lazarus S. Moore.

Congo, bank of Lafuka River; *Kassner*, 2869 a. British East Africa, Embu district; *Lieut. Orde Browne*.

Monechma platysepalum S. Moore.

Benguela, Lengue; *Gossweiler*, 4933, 4949.

Adhatoda Eylesii, S. Moore.

Congo, West Kundelungu, under trees; *Kassner*, 2795.

Peristrophe usta C. B. Clarke.

Congo, Elisabethville; *Rogers*, 10242.

3. Note on Samara polygama Roxb.

Two species of *Samara* are described in Roxburgh's *Flora Indica* (ed. Carey, i. p. 435). For want of type specimens these species have hitherto remained uncertain, the chief objection, besides our ignorance in the matter of the placentation, to their inclusion in the genus *Samara* (i. e. *Embelia*) having to do with their alleged possession of opposite leaves. *S. paniculata*, the former of the two, is a native of India, and A. De Candolle (Prod. viii. p. 139) regards it as a doubtful *Ardisia* (*A. ? paniculata* A. DC.), at the same time reproducing Roxburgh's short diagnosis. In the *Flora of British India*, curiously enough, we find no mention of it. Mez, the latest monographer of the *Myrsinaceæ* (Pflanzenfam. 9 heft. (iv. 236), p. 154), places it at the end of *Ardisia* in a short list of "species omnino obscuræ," with the note "Anne Embelia? vel potius ex ordine excludenda."

Bearing in mind the close relations at the beginning of last century between the Calcutta Botanic Garden and the British Museum, there is always a possibility that doubts about a plant of Roxburgh's may be settled by consulting the National Herbarium. In the case of *S. paniculata*, unfortunately, I have failed to find a Roxburgh specimen, but of the second species *S. polygama* Roxb., a native of the Moluccas, the Museum has a specimen answering the description and accompanied by a label in Roxburgh's handwriting. This second species A. De Candolle regarded as an *Ardisia* (*A. polygama* A. DC. *l. c.* p. 138); by Mez (*l. c.*) it is treated precisely as the other.

The specimen now to be noticed (*Roxburgh*, No. 2603 in Herb. Mus. Brit.) is nearly 40 cm. long and consists of a branched woody stem nearly 4 mm. in diameter below and less than 2 mm. near the top, surrounded by a reddish-brown cortex. The branches, of which there are several pairs, are short, patent, leafy and strictly opposite. The leaves, also strictly opposite, are lanceolate, caudate-attenuate from near the end with an obtuse tip, thinly coriaceous with upwards of a dozen pairs of nerves rather prominent below (alternately inserted upon the midrib) in either half, mostly 7–10 cm. long and 2–3 cm. broad, smooth, palely shining, grey-green above and brown below; petioles ± 5 mm. long. Flowers small, in apparently short axillary cymes (no complete inflorescence is to hand), drying black. Calyx 4-lobed, with ovate, obtuse, $\frac{1}{2}$ mm. long lobes. Petals 4, free, broadly oblong, concave on the inner face, 1·75 mm. long. Stamens 4, at the base of the petals; anthers extrorse, oblong, $\frac{1}{3}$ mm. in length, the connective not produced. Ovary of the flower examined apparently rudimentary.

The specimen has but two flowers, of which one was examined with the above result. But incomplete as it is in some respects, one is driven to the conclusion that it belongs without doubt to the *Oleaceæ*, all its characters so far ascertained being those of a tetrandrous *Linociera*: as *L. polygama*, therefore, it will be found at the Museum. Though very like several other species of *Linociera*, I have sought in vain to match it either at the Museum or at the Kew Herbarium: in general appearance it greatly resembles the Indian *L. purpurea* Vahl.

NEW RUBIACEÆ FROM TROPICAL AMERICA.—II.

By H. F. Wernham, B.Sc.

(Continued from Journ. Bot. 1912, p. 244.)

Pteridocalyx minor, sp. nov. Frutex 3-pedalis, *ramulis* strigoso-pubescentibus; *foliis* elliptico-lanceolatis, utrinque leniter et longiuscule acuminatis apice acuto, utrinque nisi in venis appresse pubescentibus fere glabris, petiolatis, *stipulis* triangularibus acutis integris extus strigilloso-puberulis; *cymis* unilateralibus pubescentibus multifloris, *bracteis* lanceolatis, *floribus* secundis; *calycis* lobis lineari-lanceolatis nisi uno in laminam sæpius elliptico-lanceolatam utrinque acuminatam acutam producto; *corollæ* tubo cylindraceo extus sparse præsertim basin versus puberulo, lobis oblongis obtusis glabrescentibus; *capsula* anguste oblonga obtusa sparse strigillosa.

Hab. British Guiana: Potaro River, Sheenabowa, *Jenman*, 1282! Hb. Kew.

The leaves are almost exactly similar to those of *P. Appunii*, the only other species hitherto described (Wernham in Journ. Bot. xlix. 317), measuring 10–16 cm. × 4–5·5 cm., with petiole about 2 cm. long. Stipules 3 mm. long. Peduncle to 3·5 cm. Inflorescence about 5 cm. broad. Flowering calyx-lobes 2–3 mm., the foliaceous lobe to 4 mm. × 5 mm. with stalk 3 mm. long. Corolla-tube 16 mm. long, 1 mm. wide, lobes 5·5 mm. × 2 mm.

The chief distinction from *P. Appunii* lies in the undivided stipules, the much narrower foliaceous calyx-segments, and the wider corolla-tube.

My thanks are due to the kindness of Dr. Stapf, Keeper of the Kew Herbarium, in placing this interesting plant at my disposal for examination.

Tournefortiopsis minor, sp. nov. Frutex sempervirens ramulis præsertim novellis araneoso-lanuginosis; *foliis* coriaceis lanceolatis ad 12 cm. × 4 cm. utrinque leniter angustatis obtusis supra glaberrimis nitentibus subtus discoloribus densissime flavo-lanuginosis, petiolo ad 1·5–2 cm., *stipulis* ovatis acuminatis acutis ad 12 mm. longis membranaceis extus glabris; *floribus* dilute rubentibus in cymis unilateralibus dichotomis multifloris axillaribus secundis ramis ad 3 cm. pedunculo 1–1·3 cm. longis; *calyce* breviter et obscuriuscule dentato; *bacca* tota vix 4 mm. longa glabra ovoidea nigra, calyce persistente obscuro.

Andes, Quichara, 6000 ft., *Pearce*, s. n.! Herb. Mus. Brit. Fl. and fr., November.

Distinguishable from the Bolivian *T. reticulata* Rusby, the only other species, by the smaller stipules and berries, and the subentire calyx-limb, which is only just perceptible in the fruit.

Gonzalea grisea, sp. nov. Frutex ramulis sparsiuscule griseo-strigosis; *foliis* ovato-lanceolatis ad ca. 16 cm. × 5·8 cm. longe acuminatis acutissimis basi sæpius acutis, petiolo vix 1 cm. attingente, utrinque præcipue in venis sparsim asperulo-strigosis, *stipulis* a basi triangulari parvo in setam ad 8 mm. longam pro-

ductis dorso in linea centrali pilosis; *spica* ad 6 dm. elongata densiflora internodiis brevibus sæpe occlusis, pedunculo ca. 5 cm. et rachide qua ramuli induto, cymulis 7–8-floris sessilibus, *bracteolis* conspicuis setaceis; *calycis* lobis linearibus 3 mm. acutis nonnunquam subglabris; *corolla* extus dense cano-sericea tubo gracili 1·5 cm. longo, lobis ovatis obtusis 2–3 mm. × 2 mm.; *bacca* sparse pilosa, calycis limbo erecto persistente coronata, lobis ad 3·5 mm. longis, biloculari.

Trinidad: *Fendler*, 401! Margarita, Venezuela: El Valle, *Miller & Johnston*, 217! Hb. Mus. Brit.

The affinity is with *G. spicata* DC., but the present species is readily distinguished by the relatively broader leaves, the denser and longer spikes of larger flowers, and the dense silvery-grey indumentum of the corolla.

Gonzalea Hayesii, sp. nov. Frutex 4–6 pedalis ramulis gracilibus pubescentibus; *foliis* ellipticis utrinque angustatis ca. 10 cm. × 3–3·5 cm. longe acuminatis acutis, utrinque in venis plus minus sparse hirtellis aliter supra scabrellis subtus fere glabris, petiolo 1 cm. nec excedente, *stipulis* parvis a basi triangulari in setam brevem acuminatis; *spica* 20–23 cm. internodis apparentibus, pedunculo ca. 2 cm., cymulis 2–3 floris, *bracteolis* setaceis parvis nec conspicuis; *calycis* lobis brevissimis late triangularibus subobtusis glabratis; *corolla* extus fere glabra tubo gracili insuper ampliato 1·4 cm. longo, ore 2 mm. lata, lobis 4 ovatis apice rotundatis 4-5 mm. × 4 mm.

In woods, near Panama: *Hayes*, s. n.! Hb. Mus Brit.

Approaches *G. panamensis* Pers. in the calyx, but is readily distinguished by the large glabrous corolla with ample spreading lobes.

Gonzalea mollis Spruce MS. in Hb. Mus. Brit. Verisimiliter frutex ramulis dense flavo-tomentosis; *foliis* ellipticis utrinque angustatis ca. 6 cm. × 2·7 cm., petiolo tomentoso 5 mm. nec excedente, supra dense hispidulis subtus pariter, flavo lanugine etiam araneoso densiuscule indutis, *stipulis* triangularibus setaceo-acuminatis tomentosis; *spica* 10 cm. v. longiore, densiflora, *bracteis* bracteolisque setaceis 5–6 mm. longis; *calycis* extus ut ovarium hispidulo-tomentosi lobis breviter subulatis; *corollæ* extus dense sericeo-strigosæ tubo ca. 1 cm. insuper ampliato, lobis rotundatis vix 2 mm. × 2 mm.

In the Andes of Ecuador: *Spruce*, 5052! Hb. Mus. Brit.

Interesting on account of the indumentum, which readily distinguishes this species.

Gonzalea asperula, sp. nov. Frutex ramulis ferrugineo-pubescentibus mox glabrescentibus; *foliis* ovalibus basi rotundatis acuminatis obtusis ca. 7 cm. × 3·3 cm., supra in vena centrali densiuscule aliter sparsim asperulo-strigillosis, subtus in venis prominentibus similiter indutis aliter pilis longioribus sparsiusculis griseis, petiolo brevissimo vix ad 5 mm., *stipulis* triangularibus caudato-acuminatis nec tamen setaceis; *spica* ca. 35 cm. cymulis ampliusculis multifloris, pedicellis 5 mm. v. longioribus; *calycis* dense strigosi lobis brevissimis; *corolla* extus asperulo-strigosa tubo validiusculo 6·5 mm. insuper ampliato, lobis oblongo-rotundatis vix 2 mm. × 1·5 mm.; *bacca* sparse strigillosa 4-loculare.

Colombia: *Triana*, 137! Hb. Mus. Brit.

Distinct in the minutely rough brown indumentum, the small leaves with rounded base, the non-setaceous stipules, and the small flowers with very short calyx-lobes and tetramerous ovary.

Note.—Gonzalea glabra Watson, in Proc. Amer. Acad. xxv. 152, based on *Pringle* 2442, is a species of *Citharexylum*, near *C. Pringlei* Greenm.

Machaonia sulphurea, sp. nov. Frutex ramulis glabris; *foliis* ovalibus basi acutis vix acuminatis ca. 5 cm. × 2·5 cm. glabris, petiolo brevissimo v. obsoleto, *panicula* ramulis pubescentibus; *floribus* minimis; *calycis* lobis oblongis ·6 mm. apice rotundato, dorso glabrescentibus marginem versus dense tamen minute puberulis; *corolla* extus glabrata tubo 1·6 mm., lobis oblongis obtusissimis ·9 mm. longis, intus minutissime puberulis; *ovario* oblongo densissime pilis sulphureis hispidulo 1·8 mm. longo.

Venezuela: *Ernst*, 483! Hb. Mus. Brit.

Distinct in the minute flowers with the hispid ovaries giving the whole inflorescence a lemon-yellow tint.

Machaonia peruviana, sp. nov. Frutex ramulis nisi inflorescentiæ glabris; *foliis* membranaceis utrinque angustatis acuminatis acutis, supra sparsissime hirtellis margine ciliato subtus nisi in venis sparsim hirtellis glabratis, petiolo supra puberulo vix ad 5 mm., *stipulis* parvis 2–4-laciniatis; *panicula* pro rata laxa et pauciflora ramulis inferioribus minute 2–3-lineatim superioribus uniformiter puberulis, *floribus* pro genere inter majores; *calycis* lobis anguste lanceolatis acutis glabris 1–1·5 mm., *ovarium* minutissime puberulum v. glabrum 2–3-loculare excedentibus; *corolla* 2·5 mm. longa extus glabra; *disco* minute flavo-puberulo 2–3-fido.

Peru: *Pavon*! Hb. Mus. Brit.

Remarkable for the laciniate stipules and frequently trimerous ovary, as also for the rather lax, few-flowered panicle.

Machaonia grandis, sp. nov. Frutex ramulis nisi inflorescentiæ glabris; *foliis* crassiuscule papyraceis, utrinque nisi subtus in vena centrali nonnunquam hic inde minute strigillosis glabris, sæpius ovalibus breviter acuminatis acutis basi cuneatis, vel nonnunquam ad oblanceolatis apice rotundato, sæpius ca. 8 cm. × 4 cm., petiolo glabro ad 1·4 cm., *stipulis* brevissimis latis mucronatis caducissimis; *inflorescentia* amplissima trichotoma 15 cm. × 15 cm. excedente, ramulis pubescentibus; *calycis* lobis oblongis obtusis margine minute ciliatis vix 1 mm.; *fructu* oblongo glaberrimo.

Colombia: Choró, Barbacoas, *Triana*, 1625! Hb. Mus. Brit.

Resembles *M. rotundata* Griseb., which, however, inhabits marshy places on the sea-coast in Jamaica, Panama, &c.; distinguished by the much ampler inflorescence, the stipules, the glabrous fruits, &c.

Malanea megalantha, sp. nov. Frutex ramulis subglabris; *foliis* ovalibus utrinque glaberrimis 10–12 cm. × 5·5–6·5 cm. breviter acuminatis subobtusis, petiolo sparsim appresse puberulo v. subglabro 1·5–2 cm. longo, *stipulis* oblongis apice rotundis basi parum angustioribus ad 1·2 cm. × 1 cm. extus præsertim basin versus hirtellis; *inflorescentia* thyrsoidea dense appresse flavo-pubescente ad ca. 5·5 cm. × 3 cm., *floribus* flavis suaveolentibus pro genere maximis ad ca. 7 mm. longis; *calycis* fere glabri dentibus latis brevissimis acutis patentibus; *corolla* extus appresse pubescente.

Hab. West Indies: Tobago, *Broadway*, 4024! Hb. Mus. Brit.

Notable for the flowers, which are by far the largest of the genus.

Cephaelis peruviana, sp. nov. Frutex (?) ramulis densiuscule ferrugineo-pilosis demum glabrescentibus; *foliis* late ellipticis ca. 6 cm. × 3·5 cm., obtusis vix nisi junioribus acuminatis, basi rotundatis, coriaceis, supra nitentibus nisi in venis sparsim hirtis glabris subtus in venis pilis paucis patentibus conspersis aliter glabris, petiolo dense ferrugineo-pubescente ad 5 mm. longo, *stipulis* late ovatis glabrescentibus, ad 7 mm. latis parte integro breviore insuper in aristis binis distantibus 3–3·5 mm. longis productis; *capitulo* tubuloso-oblongo, ca. 2·5 cm. × 1·2 cm., pedunculo ut ramuli induto ad 2·5 cm. longo, involucri *bracteis* 4 extus nisi basin versus puberulis glabris ovatis, *floribus* sæpius 3 pro genere inter maximos bracteolo quoque parvo lanceolato; *calyce* breviter dentato; *corolla* infundibulari-cylindracea tubo extus infra glabro, 1·5 cm. longo in ore 5 mm. lato, insuper extus qua lobi ovati obtusi 5 mm. × 3·5 mm. flavo-piloso.

Guayaquil, *Ruiz & Pavon*! Hb. Mus. Brit.

Readily recognized by the shining leaves and the compact heads, each with three large flowers.

TWO SOUTH AFRICAN PLANTS.

By R. Dümmer.

Acmadenia barosmoides Dümmer, sp. nov. Fruticulus ad 1 m. altus (fide *Niven*); ramuli conferti, brevissimi, angulati, parcipilosi, brunei densifoliosique. Folia ascendentia, mox patula subrecurvave, late obovata, apice rotundata obtuse apiculata, basin versus in petiolum complanatum circ. 1 mm. longum pilosulum evanida, 5–7 mm., longa 3–4 mm. lata, planiuscula, supra nitente atroviridia, subtus magis pallidiora, obsolete costata, medio glandularum seriebus binis instructa, coriacea, primo pilosula, mox utrinque glabra, margine incrassata, subrecurva, glanduloso-punctata. Flores solitares, perbreviter pedicellati, ramulis terminati; pedicelli 1–1·5 mm. longi, pubescentes. Calyx 5·5–6 mm. longus, scariosus, segmentis anguste oblongis obtusis dorso carinato-convexiusculis glabris, intra profunde concavis, margine creberrime pilosis. Petala unguiculata, circiter toto 1 cm. longa,

glabra, limbis ovalibus albidis (sicco) obtusis vel rotundatis 3–3·5 mm. latis in unguem sulcatum attenuatis. Stamina petalis subæquilonga, glaberrima. Stylus crasse filiformis, 5 mm. longus, glaber, stigmate truncato.

The recognition of *A. barosmoides* should offer no particular difficulties in view of the Barosma-like facies of this species. The specimen upon which the preceding description has been founded is preserved in the British Museum, and was collected by Niven, one of the earlier travellers, on alpine stony places in Lange Kloof, in the Uniondale district of Cape Colony.

ARGYROLOBIUM AMPLEXICAULE Dümmer, comb. nov.—*Lotus amplexicaulis* E. Meyer, Comment. Pl. Afr. Aust. 92.—Harvey in Harv. & Sonder, Fl. Cap. ii. 158.

E. Meyer, having only seen fruiting material of this plant, was led to regard it as a *Lotus*, Harvey following him in this, owing also to paucity of material. Kew, being in possession of flowering specimens of Drège's, as also of subsequent collections, presented an opportunity of investigating this point, which suggests that the species has been wrongly interpreted, and should be referred to *Argyrolobium*, approaching *A. barbatum* Walp. most closely, but differing in the larger leaflets and stipules, and many-flowered subsessile heads.

The following specimens have been examined :—

SOUTH AFRICA.—Coast Region, Komgha; between Zandplaat and Komgha, 600–900 m. *Drège*! Eastern Region, Tembuland; Bazeia, *Baur*, 497! Griqualand East! grassy slopes above Clydesdale, 750 m.; *Tyson*, 1914! 1256! Natal, Inanda, *Wood*, 1181! on a grassy hill, Mooi River, *Wood*, 4074! *Gerrard*, 1729!

LORD AVEBURY.

(1834—1913.)

THE writer has pleasant recollections of certain warm summer afternoons spent during a Cambridge Long Vacation term nearly thirty years ago in company with two little books—*Flowers, Fruits, and Leaves*, and *British Wild Flowers Considered in Relation to Insects*. To a student training in the somewhat restricted morphological and physiological school of the period, these introductions into the field of plant biology came both as a relief and a revelation. They showed the plant as a living organism in close association with its environment, and suggested underlying meanings for the wonderful diversity in position, form, and arrangement of the vegetative and floral organs. The author, Sir John Lubbock, a close friend and ardent disciple of Charles Darwin, and withal an easy writer in a simple popular style, did much to popularise the principle of adaptation to environment in the plant kingdom. These excursions into botanical fields were rather the recreations of a mind busied with many and more serious matters than elaborated scientific treatises; but if his conclusions have sometimes been criticised as narrow or amateurish, it is beyond dispute that in his published botanical works Lord Avebury has brought together a considerable mass of facts—the result of much careful observation. The most important is the book on *Seedlings*, a standard work in which are minutely described and carefully figured the form or structure of the seeds and seedlings of a large number of species arranged in their genera and families in systematic order. The book contains a wealth of information, and has been freely drawn upon by subsequent writers.

The volume on *Buds and Stipules*, which appeared in the International Scientific Series, is an interesting account of the methods of bud-protection and the nature and uses of stipules in a number of trees, shrubs, and herbaceous plants. Lord Avebury's last important botanical work, *Notes on the Life-history of British Flowering Plants*, which appeared in 1905, was an attempt to supplement the more technical British Floras by notes on the life-history of the plants. While admittedly incomplete, the book is a useful and suggestive companion to the severely systematic Flora.

Lord Avebury also communicated botanical papers on similar lines to the Journal of the Linnean Society (of which he was President from 1881–1886), and quite recently published in the Royal Microscopical Society's Journal the results of a long series of observations on the form of the pollen in numerous species of flowering plants.

A notice of Lord Avebury's services to botany would be incomplete without some reference to the great interest, both personal and as a trustee, which he took in the Department of Botany of the British Museum. He was strongly opposed to the dismemberment of the Natural History Section by the separation of its botanical side.

A. B. R.

SHORT NOTES.

The Myrrh Plant.—The identification of the myrrh plant was for many years a vexed question, arising from the difficulty of obtaining good flowering or fruiting specimens. In Bentley & Trimen's *Medicinal Plants* (t. 60) the fruit figured does not belong to the plant illustrated. The illustration of the plant given (t. 355) by Nees under the name of *Balsamodendron Myrrha* in Beschreib. off. Pflanz. 1829, right-hand figure, shows the fruit attached, and is correct, agreeing perfectly with specimens of the plant brought for me by Mrs. Lort Phillips, from Somaliland, together with pieces of the bark of the same tree with true myrrh attached to the bark. When, however, Prof. Engler superseded the genus *Balsamodendron* by *Commiphora*, and published a *Commiphora Myrrha* Engl. from Arabia, which he expressly states is not aromatic, and yields no resin, and so obviously could not be the source of the myrrh of commerce, further confusion was created. Of this tree he describes a variety, "Mol-mol," which corresponds exactly as regards leaves with Nees's *Balsamodendron Myrrha.* Moreover, "Mol-mol" is the Somali name for the gum-resin from myrrh, so that apparently Engler makes the true myrrh plant a variety of his *C. Myrrha*, which yields no resin, has no aroma, and possesses trifoliate leaves with much larger lateral leaflets than the myrrh plant. This I explained in the *Pharmaceutical Journal* for Jan. 14th, 1899, pp. 26, 27, giving illustrations of the plants, and pointing out that Nees's specific name should be retained, and that the plant which yields myrrh should be called *Commiphora Myrrha* (Nees). As it is now necessary to introduce correct nomenclature into the forthcoming new edition of the *British Pharmacopœia*, I venture to suggest that to save further confusion the name *Commiphora Myrrha* Holmes should be adopted as the name of the tree yielding Somali myrrh with the synonyms *Commiphora Myrrha* var. "Mol-mol" Engl., excl. type; *Balsamodendron Myrrha* Nees. It may be noted that the Somali name "Mol-mol" is only applied to the gum-resin myrrh, but the tree is called "Didin," pronounced "Didthin." An excellent account of the myrrh tree and the allied species is given in N. E. Drake-Brockman's *Somali-land*, 1912. The Somalis distinguish the myrrh produced near the coast-line on lower rocky ground as Guban myrrh, and that produced on the inland range of mountains as Ogo myrrh, but there seems to be little difference in the two trees except in size.—E. M. HOLMES.

AUTHORSHIP IN THE 'AMŒNITATES ACADEMICÆ' (p. 101).—A note from W. Coxe's *Literary Life and Select Works of Benjamin Stillingfleet*, ii. 185 (184) may be added to Dr. Jackson's paper: it is appended to the opening sentence in the "Preface to the Miscellaneous Tracts," which runs:—

"The following pieces were selected from many others published by several ingenious members of that great and hitherto unrivalled school of Natural History, the University of Upsal in Sweden, under the presidence of Linnæus."

The note is as follows:—

"Linnæus, Phil. Bot. p. 9, has these words, 'vid. dissert. nostra de ficu." Now there is a piece in *Amœnitates Academicæ*, vol. 1, on this subject, in which the matter referred to is contained. This piece goes under the name of Cornelius Hegardt, though Linnæus plainly quotes it as his own. How far that may be the case of all the other pieces in the Amœn. Acad. I cannot pretend to say. But it is most likely from the practice in foreign universities, in relation to theses held for degrees, that they must, in great part, be attributed to him at present. Mr. Stillingfleet afterwards learnt from Dr. Solander that the materials of these pieces were furnished by Linnæus. He adds that the President employed each of his disciples in studying and investigating the nature of a plant, particularly in relation to soil, site, and aspect, time of flowering and foliation, and to what insects it furnished food. The result of these observations he threw into the form of Essays, which were communicated to those who were to read dissertations on taking degrees, or on other occasions."—JAMES BRITTEN.

Iris versicolor.—In his review of Mr. Dykes's *Genus Iris* (p. 107) the Editor remarks, "This plant finds no place even in Mr. Druce's too comprehensive *List*." Although not included in the *List*, it is to be found in the "Additions" to it which appeared in the *Report of the Botanical Exchange Club*, p. 350, 1908, from the locality cited by Mr. Dykes. It is surprising that the author of the Monograph should have omitted any reference to the occurrence of *I. spuria* in Lincolnshire, which was published in this Journal for 1902, p. 101, by the Rev. A. Woodruffe-Peacock. It has grown there for upwards of a century, and previous to the publication of his work I sent Mr. Dykes freshly gathered specimens from that county. He named them *I. spuria*, as did also Mr. J. G. Baker, although the colour of the flowers did not appear to me to agree with the descriptions in his work. Mr. Dykes says that he has no doubt that my Lincolnshire specimens represent some form of *spuria*, but he adds that "the whole *spuria* question is a puzzle." I am not quite sure that Mr. Dykes's summary dismissal of the varieties of *I. Pseudacorus* will be found to be justified. It may be that in the locality where his *Bastardi* grew that the type also occurred. In that case the plants may have hybridized, and it would not be surprising if the offspring were mixed. In a work of such importance some reference should have been made to the variety *citrina* of *I. fœtidissima*. On the whole, to British botanists *The Genus Iris* will, I am afraid, be found to be disappointing.—G. Claridge Druce.

Culinary Mints.—A mint not mentioned by Mr. Marshall (p. 143) is *M. gracilis* var. *cardiaca* Baker, which, according to an article on "Oil of Spearmint" by Mr. E. M. Holmes in the *Perfumery and Essential Oil Record* (1911, p. 198), was one of the species of garden mint cultivated in the Middle Ages. He identifies it with the plant described and figured by Fuchs in 1543 under the name of *Mentha hortensis verticilla Ocimi odore*. Parkinson includes it with spearmint, under which name it was cultivated in gardens in his day, and is still grown as the true garden mint, especially in Wiltshire, Somersetshire, and in some parts of Kent, replacing *M. viridis* in many gardens. By the old herbalists it was considered inferior to *M. viridis* as a febrifuge, but as a stomachic and cardiac it was believed to be superior, whence its name. I have tried it once or twice for mint sauce, but found it somewhat inferior in flavour to *M. viridis*. Mr. Druce says it has also been cultivated in Oxfordshire as a "mint."—A. Bruce Jackson.

To the list of mints mentioned by the Rev. E. S. Marshall *M. alopecuroides* may be added; I have seen it not only in Scotland but also in England cultivated as a pea-mint. I have also seen hybrids of *M. longifolia* so used.—G. Claridge Druce.

Euphorbia Lathyrus L.—This plant, more often seen in cottage gardens than elsewhere, occurs in some few coppiced woods in various parts of England. In this kind of habitat some British botanists seem disposed to accept the caper spurge as indigenous. Continental opinion, on the other hand, inclines to the view that this plant is non-indigenous in Western Europe. It has long been known to inhabit certain woods in Kent and Sussex, but I am not aware of it having been noticed under similar conditions in the neighbouring county of Surrey. Recently, when searching in a wood at Chelsham, in company with Mr. Walter Turner, the latter drew my attention to numerous plants of this species, forming part of the herbaceous undergrowth of the wood. —C. E. Britton.

Colour of Flowers of Papaver hybridum. — At p. 172, reference is made to this being stated in Hooker's *Student's Flora* to be "scarlet." I have already directed attention (see Fl. Oxf. 18; Fl. Berks, 34) to the fact that they are *crimson*, and this is so stated in Syme's *English Botany*. Babington (*Manual*) says they are purplish; Withering (Nat. Arr. ed. 3, 594), dark dirty scarlet; Gray (Nat. Arr. ii. 704, under the name *Cerastites hybrida*) says they are "scarlet, violet at the base"; and Smith (*English Flora*, iii. p. 10) that they are deep scarlet or crimson. We need not, therefore, attribute the "scarlet colour" of the British plant to "the less amount of sunshine in England," or assume that the British plant is different from the Continental one, but may consider that there has been a confusion in the minds of those who recorded it as scarlet of colour.—G. Claridge Druce.

Elymus arenarius in South Devon.—During the past two years Mr. H. A. Druett has brought me examples of this grass from Exmouth, where he has seen two or three large patches of it. I believe it has required verification as a South Devon plant. —C. E. Britton.

REVIEWS.

Vegetation of the Peak District. By Dr. C. E. Moss. Demy 8vo, pp. x. + 235. With 36 illustrations and 2 fully coloured vegetation maps in pocket of cover. Cambridge University Press, 1913. 12*s.* net.

This book has long been awaited by British ecologists. The investigation, the author tells us in his preface, was commenced at the beginning of 1903: it is more or less common knowledge that the field work was practically completed at the time he took up the Curatorship of the Cambridge Herbarium in 1908. The delay in publication has been chiefly caused owing to the expense of printing the maps. The Board of Agriculture flirted with the idea of publishing the memoir, and this entailed some additional mapping which is not utilized in the work in its present form. It is regrettable that there is no Government undertaking for the publication of botanical maps, having regard to the value of such works to scientific agriculturists, foresters, geographers, &c., and the knowledge they furnish with regard to the nature and possible utilization of the "waste lands" of the country.

Dr. Moss has been a pioneer in this branch of botany, and has made numerous substantial contributions to the study. His work with Dr. W. G. Smith in Yorkshire, his account of the vegetation of Somerset, and his paper on the Fundamental Units of Vegetation must be regarded as landmarks in the history of the study of British vegetation from the plant geographer's point of view.

The area investigated is that comprised in Sheet 99 of the Ordnance Survey Series, together with the southern half of S. 86 and the northern half of S. 111, *i.e.* an area of 360 square miles, including portions of Lancashire, Cheshire, Staffordshire, Derbyshire, and Yorkshire. The maps are printed in twelve colours, each colour representing a different association; where there is a mixed association this is represented by stippling or patching.

The maps are on the scale of one inch to the mile, the scale which experience has shown to be a suitable one for maps intended to show the distribution of the more important plant associations of the British Isles. In the field, maps on the scale of six inches to the mile were used. The present writer can bear testimony to the care with which the mapping was done, and many botanists have accompanied the author on lonely tramps across the moors during the years in which the work was in progress. The northern map deals with the vegetation of the non-calcareous sandstones and shales of the Coal-measure, the Millstone Grit, and the Yoredale or Pendleside series. Here moorland zonation is particularly well seen, the various associations standing out in sharp contrast. The southern map includes the vegetation of the calcareous Carboniferous limestone, and shows well the distribution of ash woods.

In the text there is so much matter of interest to the student of all aspects of plant life that only a mere indication can be given of the contents. In the introductory chapter many important general points are considered, with special reference to the specific area. Two exceedingly useful tables are provided, one giving the chief geological strata and soils of the district and the general character of the accompanying vegetation, the second dealing with calcareous, siliceous, and acidic peaty soils and their characteristic plants. Tables are also given of the average monthly rainfall for the years 1870 to 1899; the temperature, the direction and velocity of the wind, and the humidity of the atmosphere at 335, 500, and 700 metres during about 600 days of the years 1908 and 1909. The consideration of such matters and their application to the district show how thoroughly the author has entered into his task. His concept of the units of vegetation—a concept which was adopted in and really made possible the writing of the *Types of British Vegetation*, edited by Mr. Tansley—is briefly but clearly stated. The chief interest in the book to many phytogeographers will be in the working out in detail of these concepts in a definite area. The further chapters deal with Woodland, Scrub, Grassland, Rocks and Screes, Marsh and Aquatic associations, Moorland, and cultivated land. In each case lists of characteristic plants are given, with an indication of the relative abundance of each. The factors which appear to be of importance in accounting for the presence and also of the differential distribution of the various associations in the district are given at length.

Of great interest is the chapter on woodland association, where the differentiating factors seem to be the chemical nature of the soil, the depth of the soil, and the altitude of the woodland site. The account given of the conversion of woodland into scrub, and of scrub into grassland, heath, or moor, is clear and convincing.

In the case of moorland associations, in particular, much has been added to our knowledge. Factors related to the distribution of the associations are clearly stated, and the transitional associations, so puzzling to beginners in ecology, are fully worked out.

Many interesting facts are given by the way, *e.g.* the complementary plant community of the calcareous heath (*Calluna* and *Poterium*), and that of the dry places in ash woods (*Mercurialis* and *Adoxa*), the *nunatak* nature of the Peak, &c.

The book is full of useful tables and diagrams. Appendices are given of "Summary and Relations of the Plant Communities of the Peak District," "Summary of British Plant Formations and Associations," and "List of Works referred to in the Text."

The text is interspersed with numerous references to related literature; there is also a useful index. The book is well got up, illustrated by many good and appropriate photographs, and written in an exceptionally clear and attractive style.

J. Ramsbottom.

Sporeplanterne (*Kryptogamerne*) *med 513 i teksten trykte figurer eller figurgrupper af L. Kolderup Rosenvinge.* Kjöbenhavn og Kristiania: Gyldendalske Boghandel, Nordisk Forlag: 1913. Large 8vo, 388 pp.

The text of this work is in Danish. The author states in the introduction that when Prof. Warming was contemplating the publication of a new edition of his *Systematiske Botanik*, he proposed that Dr. Rosenvinge should prepare the Cryptogamic section and publish it as an independent volume co-ordinate with the Phanerogamic section, which was to be elaborated by Prof. Warming himself. Dr. Rosenvinge willingly undertook the task; but instead of merely remodelling the text of the older work, he has given an entirely new presentation of the subject. This was necessary, owing to the great increase of knowledge which has arisen in such branches as developmental history and cytology. The extent of the book is accordingly larger; and the value to the student is correspondingly increased.

This latest text-book of cryptogamic botany comprises the following:—(i) Thallophyta with eleven classes—Bacteria, Cyanophyceæ, Myxomycetes, Flagellata, Dinoflagellata, Diatomeæ, Chlorophyceæ, Phæophyceæ, Rhodophyceæ, Phycomycetes, Mycomycetes, with the Fungi Imperfecti and the Lichenes as unclassed groups; (ii) Archegoniatæ with two classes—Bryophyta and Pteridophyta (ending with the Cycadofilices). It is to be hoped that an English translation of this useful compendium of cryptogamic botany may soon be forthcoming; for it is a pity that the text should be issued in Danish only, a tongue which is not commonly understood. The figures are abundant, and are of course easily appreciated. They form a remarkably fine series of types selected throughout the cryptogamic kingdom. Many have been specially drawn.

A. & E. S. Gepp.

BOOK-NOTES, NEWS, &c.

A pleasant little function took place at the Criterion Restaurant on the evening of June 9th, when, in commemoration of the jubilee of this Journal, the present Editor, who has filled that post for more than thirty-three years, was entertained at dinner by a representative gathering of contributors. The chair was occupied by Dr. Rendle, who in proposing the health of the guest of the evening, summarized Mr. Britten's work. He recalled the fact that Mr. Britten's connection with the Journal began with the first volume, in which his name appeared as a contributor. Before assuming the editorship in 1883, Mr. Britten had for a time acted for the previous Editor, Dr. Henry Trimen, after the latter left England for Ceylon. The Journal has been not merely the recognized organ of British Botany, but had also justified its title as regards foreign botany, and the scope of the articles contributed covered a very wide range. The General Index, promised in 1884, was still a desideratum. Special reference was made to Mr. Britten's contributions to botanical bibliography, and the great services rendered to working systematics by his indication of the wealth of material contained in the important early botanical collections in the Department of Botany of the British Museum, and the hope was expressed that Mr. Britten would shortly put the seal to his valuable contributions to historical botany by the completion of his Catalogue of the Sloane Herbarium. Mr. Britten had also played an important part in the movements of the last ten years, tending to the precision of our Rules of Botanical Nomenclature, and the abandonment of the old go-as-you-please methods. In his editorial capacity he had been sometimes criticized by his contributors, but those contributors who were loudest in complaint were frequently the most indebted for the useful work done by Mr. Britten on their papers, the effect often being to transform an almost hopeless muddle into a valuable contribution.

Dr. Rendle was followed by Sir David Prain, Dr. Daydon Jackson, the Rev. E. S. Marshall, Mr. F. N. Williams, Mr. James Groves, Mr. G. S. Boulger, Mr. H. N. Ridley, and Dr. Otto Stapf, all of whom made reference to the useful place filled by the Journal, and to Mr. Britten's wide knowledge of the literature of taxonomic botany, which was always at the service of enquirers. Several of the speakers also gratefully recalled the help they had received from Mr. Britten during a period of friendship lasting for very many years. Besides those present, numerous British botanists had written to express their regret at their inability to be present and their good wishes to the Journal and its Editor. Mr. Britten, in acknowledging the kind things that had been said, made special reference to Mr. C. E. Salmon, to whom the proposal and execution of the programme was mainly due.

The Department of Botany of the British Museum has added to its publications an important contribution to Nigerian Botany in a *Catalogue of the Plants collected by Mr. and Mrs. P. A. Talbot in the Oban District.* The important discoveries in other branches of science by these travellers have attracted considerable attention, and their botanical collections present many features of interest. We learn from Dr. Rendle's introduction that of the 1016 species and varieties, 195 are new, 9 of which are new genera—*Alphonseopis* and *Dennettia* in Anonaceæ; *Crateranthus* (Myrtaceæ); *Afrohamelia*, *Dorothea*, *Diplosporopsis* and *Globulostylis* (Rubiaceæ); *Scyphostrychnos* (Loganiaceæ); *Talbotia* (Acanthaceæ; antedated by *Afrofittonia* Lindau, published on March 28); and *Amauriella* (Araceæ). The work has been undertaken almost entirely by the officers of the Department of Botany—the Polypetalæ by Mr. E. G. Baker; the Gamopetalæ by Mr. Wernham and Mr. S. Moore; the Monocotyledons by Dr. Rendle; the Fungi by Mr. Ramsbottom, who gives a very interesting description of *Lentinus Tuber-regium*: a complete list of all the plants collected is given separately. The memoir, which costs 9*s.*, is illustrated by seventeen plates; a selection of the large collection of drawings by Mrs. Talbot, which have proved of great assistance in working out the collection, will be published separately.

The veteran Australian botanist, Mr. F. Manson Bailey, has published in a large and very heavy volume—it weighs 4 lb. 2 oz. —a *Comprehensive Catalogue of Queensland Plants*, both indigenous and naturalized. The preface is dated 1909, the titlepage bears no date: but a note prefixed to the appendix (p. 835) is dated December 1912, so that the volume was issued during the present year. The appendix contains two new species—*Aristotelia trilocularis* and *Sarcochilus minutiflos.* The book is, as stated, merely a list, with occasional notes; it is extravagantly printed on shiny paper and contains 976 poorly executed figures and 16 fairly good coloured plates. "The present publication," we are told in the preface, "is a second edition of the *Catalogue of the Indigenous and Naturalized Plants of Queensland* which was published in June, 1890"; from a bibliographer's point of view it is to be regretted that the title was changed.

Apart from its purely systematic contents, the latest part (vol. iv. pt. 1, published May 31) of the *Transactions of the British Mycological Society* contains two papers of special interest. The President, Miss Gulielma Lister, gives an exceedingly interesting account of "The Past Students of Mycetozoa and their Work," and Mr. Ramsbottom, in the paper modestly entitled "Some Notes on the History of the Classification of the Uredinales," gives a very full account of that history, which he prefaces with Robert Plot's (not "Plot*t*") account of "Meldews" (1686) and concludes with a full list of the British species of the group. Miss Lister also enumerates the Mycetozoa found during the "foray" in the Forres district last September, with the description and plate of a new species, *Lamproderma insessum*: the other papers include notes on the fungus-flora of the Moray district, by D. A. Boyd; notes on British species of *Corticium*, by E. M. Wakefield; descriptions of two new species (*Ascobolus Carletoni* and *Calycella Menziesii*) by M. Émile Boudier, with a beautiful plate by Mr. Carleton Rea; and descriptions of new and rare British fungi by the editor, Mr. Carleton Rea, Miss Lorrain Smith, Mr. J. W. Ellis, Dr. Jessie Elliott, and Mr. Ramsbottom. The part, which contains 198 pages, is issued by Messrs. Baylis & Son, of Worcester, and is issued to non-members at the reasonable price of 10*s*. 6*d*. It is well printed, but we think the practice followed in this Journal of printing the names of new species in conspicuous type would add to the convenience of reference, and it seems a pity not to utilize the headings of the pages for giving information as to the matter to be found beneath.

At the meeting of the Linnean Society on May 1, a paper by Prof. Percy Groom, F.L.S., and Mr. W. Rushton, entitled "The Structure of the Wood of East Indian species of *Pinus*," was explained by Prof. Groom. The paper contained an account of the structure of the secondary wood of the five Indian species of *Pinus*. The following points of more general interest were mentioned. In *P. Khasya* and *P. Merkusii* there occur radial bundles of bent tracheides having bordered pits on all their walls. In *P. Merkusii* the pits on the radial walls of the normal spring-tracheids are often triseriate but typically abietinean in form and arrangement; but often they are grouped together in "nests" of three or four, forming patterns like those in the fossil *Cedroxylon transiens* W. Gothan, which, in addition, showed typical araucarian pitting. According to Sanio, one or more bordered pits arise in a "primordial pit-area," and frequently do not occupy the whole area; the authors, relying on Sanio, point out that the band-like markings fringing individual pits in uniserate type, or pairs, or threes, or groups of pits in the other species of *Pinus*, represent the persistent margins of the original primordial pit-area: hence they term these bands "Sanio's rims." Where a Sanio's rim occurs the structure of the wall is peculiar; the middle lamella is pectic and not perceptibly lignified; the remaining part of the wall is lignified. Elsewhere the middle lamella does not stain so deeply or typically with pectin reagents, but does stain with phloroglucin and hydrochloric acid. These "Sanio's rims" are the structures termed by Miss Gerry "Sanio's bars," and are in no way composed of cellulose, as she alleges. The term "Sanio's bars" was invented by C. Müller, and he defined them as rod-like structures crossing the lumina of tracheides or constituents of the phlœm, which are lignified in the xylem but not so in the phlœm. C. Müller made the generalisation that "Sanio's bars" occur in all subdivisions of the *Coniferæ*, including *Araucariaceæ* and *Taxaceæ*, also in *Ginkgo*.

At the meeting of the Linnean Society on 5th June Mr. H. W. Monckton showed a flower of *Sisyrinchium angustifolium* Mill., which had been found on Dartford Heath a short time before. Miss L. S. Gibbs gave an abstract of her paper entitled "A Contribution to the Flora and Plant-Formations of Kinabalu and the Highlands of British North Borneo," illustrating her remarks with a series of lantern-slides. Mr. A. D. Cotton explained the principal points of Mme. Weber van Bosse's paper on the Red Marine Algæ from the Indian Ocean. A paper, by Prof. R. J. Harvey Gibson, on *Mystropetalon* Harv. was briefly explained by Dr. Stapf. The material was sent by Mrs. Solly of Sir Lowry's Pass as *M. Thomii*, but was found to differ; the rhizome was attached to roots of *Protea*. A very intractable brown deposit in the cells is not "Balanophorin," but some unknown carbohydrate of the cellulose group, for which the name "Mystrin" is proposed. The male and female flower are described, and the name *M. Sollyi* proposed for the new species.

The short notice of the *Census Catalogue of British Hepatics*, second edition (W. Ingham, 52, Haxby Road, York. 1913. 1*s*. net; 1*s*. 6*d*. interleaved), which appeared in the May number of the Journal (p. 176), was unfortunately premature, inasmuch as the whole issue (save some half dozen early copies) was spoiled by a blunder at the printing works. No copies, therefore, were available for distribution. This misfortune proved in one way, however, to be a blessing in disguise, in that it enabled Mr. Ingham to intercalate numerous further records supplied by members of the Moss Exchange Club, thus rendering the geographical distribution of the species and varieties more complete in the revised issue which is now ready for sale. Attention may also be drawn to the *Eighteenth Annual Report* of the Moss Exchange Club (York: Coultas & Volans. March, 1913, pp. 61-87). It contains lists of the mosses and hepatics distributed among the members, with some scattered critical notes on the more interesting specimens.

The Rev. E. F. Linton has issued a circular of which the following is a copy: "It is some years since the four Fascicles of the Set of British Willows was issued, and several interesting forms have been met with since then; some have been grown in the garden, and others have been met with, by myself or other botanists, which are different, in sex or in some structural points, from those sent out before. I propose to issue such forms in small batches, as they come to hand, not waiting to get together enough to form a fascicle, as willows are so difficult to preserve from insect ravages, especially the male flowers. At the present time I have seven sheets ready for issue, during the next month or so, and offer them at 7*d*. a sheet post free. The present issue will therefore be 4*s*. 1*d*.; and any future issue will be at the same rate." Mr. Linton's address is Edmondsham Rectory, Salisbury.

THE MUSSÆNDAS OF THE AFRICAN CONTINENT.

By H. F. Wernham, B.Sc.,
Department of Botany, British Museum.

The Rubiaceous genus *Mussænda* occurs in the warmer parts of Asia and Africa, and in the Mascarine and Pacific Islands. It is notable for its showy flowers, with the frequent development in many species of one or more of the calyx-lobes, in the exterior flowers of the corymbose inflorescence, as an attractive petaloid lamina. This phenomenon is parallel, biologically, with the development of "ray" flowers in *Umbelliferæ*, *Compositæ*, &c., in which, however, the lobes of the corolla, not of the calyx, are concerned. Its significance lies in the attraction of insect-visitors to an entire, compact inflorescence, instead of to a single flower, so that several flowers may be cross-pollinated at a single brief visit from a suitable insect. The floral arrangement is correlated with that "umbellifloral tendency" which lies at the root of the Rubiaceous ancestry*—*i. e.* the presentation of a continuous floral surface to visiting insects.

Mussænda is particularly interesting from the aspect of the biological principle of insect-attraction. The tube of the corolla is typically long and slender in all the species and does not vary much; but the limb displays considerable variation in relative size, in accordance, usually, with the species. In some species (§ *Landia*)—most of those native in Madagascar, for example, about a dozen in all—the calyx-lobes are all normally small and equal, or nearly so. In these the attractive function is adequately discharged by the corolla, for the limb is amply developed. The same applies to the African *M. elegans*, dealt with in the present paper, in which the bright scarlet corolla-limb may attain 6 cm. in diameter, while in none of the specimens are the calyx-segments modified into an attractive petaloid lamina. In species like *M. tenuiflora*, on the other hand, the width of the inconspicuous corolla-limb is reduced to a few millimetres, and the calyx-segments lying towards the periphery of the inflorescence are petaloid. *M. arcuata* seems to represent a transitional stage in this regard; the petaloid development is quite rare, and the corolla-limb is of very variable relative width.

The examination of several recent collections in the National Herbarium has directed my attention particularly to the African species of the genus, and has revealed the existence of several novelties. These are described below, together with references to the descriptions of all the known species indigenous in the African continent. Details of the specimens in the two principal British herbaria are given, as well as a key to all the species, with one or two doubtful exceptions.

My grateful acknowledgments are due to the authorities of the Kew Herbarium for placing the material under their control freely at my disposal.

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* See Wernham, *New Phytologist*, xi. (1912), 226, 227.

Distribution of the African Species.

As just now mentioned, about a dozen species are peculiar to Madagascar and the neighbouring Mascarine Islands. One species, *M. arcuata*, is common to these islands and to the African Continent. *M. frondosa*, widely distributed over Malaya, India, China, and Polynesia, has not been recorded from Africa.

M. elegans and *M. arcuata* have the widest distribution of all the African species. The former appears in Senegal, where it is the sole representative of the genus; following the west coast, we find records of it in Sierra Leone, from Liberia to Nigeria, in the Cameroons, the Congo basin, and Angola; in Central Africa it occurs in Monbuttu-land; and it has been collected by Dawe in Uganda, its most easterly station. Following a similar direction, *M. arcuata* has been found from Sierra Leone to Angola; in Niamniam-land and Djur-land, in Uganda, and in Nyasa-land. The same species occurs abundantly about the east coast from Mombasa to Gaza-land, and its distribution extends to the Mascarine Islands.

M. erythrophylla, a striking species commonly cultivated, with showy red flowers and petaloid calyx-lobes, is found along the west coast from Sierra Leone to the Cameroons, in the Congo basin and Angola, and, like *M. elegans*, as far east as Uganda. Two other West African species are *M. Isertiana* and *M. grandiflora*, the distribution of the former extending from Sierra Leone to the Cameroon River. The latter, a very distinct species (*q. v.*), has been recorded only from Sierra Leone and Liberia. *M. tenuiflora* occurs from Nigeria to the Cameroons, and, as a variety, in Angola. For the rest, one species is endemic in Sierra Leone, three in Liberia, two in Lagos, one in the Gold Coast, one in Nigeria, one in the Cameroons, one in Gaboon, one in the Congo basin, three in Angola, four in Central Africa (Nile-land), and six about the east coast.

Key to the Species.

Note.—The term "calyx-lobes," unless otherwise stated, refers throughout to the normal small lobes, not to those with petaloid development.

a. Calyx-lobes short and tooth-like, or subulate, then rarely so much as 2·5 mm. long (*M. monticola*); or broadly lanceolate, triangular, ovate or oblong, then usually less than 3 mm., rarely so much as 7 mm. (*M. Afzelii*).
  Branchlets scabrid with rigid backwardly-curved hairs 1. *scabrida.*
  Branchlets not scabrid.
    Corolla-tube densely yellow pubescent or hirsute externally, with hairs all directed to base.
      Calyx-lobes obtuse .... 2. *rivularis.*
      Calyx-lobes apiculate-acuminate .... 3. *Afzelii.*
    Corolla-tube hairs, if present, not directed toward the base, except occasionally in lower part.
      b. Primary lateral leaf-veins 7 at least on either side of the midrib, usually 10 or more.

- c. Corolla glabrous externally, or with a few closely adpressed hairs.
  - Branchlets hispidulous with rather long subpatent hairs (ex descr.) .... 4. *monticola.*
  - Branchlets minutely pubescent or puberulous, or glabrescent.
    - Branchlets not glabrous, stipules bifid.
      - Ovary four or five times as long as the calyx-teeth .... 5. *Buntingii.*
      - Ovary subequal to the calyx-teeth... 6. *Chippii.*
    - Branchlets glabrous, stipules entire... 7. *abyssinica.*
- cc. Corolla puberulous, pubescent or hispidulous externally (sometimes subglabrous in *M. Isertiana*).
  - Stalk of petaloid calyx-lobe usually less than 1 cm.; small lobes very short and broader than long.................. 8. *Isertiana.*
  - Stalk of petaloid calyx-lobe usually reaching 2–3 cm.; small lobes much longer than broad.
    - Corolla-tube barely 2 cm., limb more than half tube-length in diameter 9. *brachyantha.*
    - Corolla-limb upwards of 2·5 cm., limb usually much less than half-tube length.
      - Calyx lobes oblong-obtuse ...... 10. *afzelioides.*
      - Calyx-lobes acute-acuminate or subulate.
        - Branchlets densely hispidulous with red deflexed hairs 11. *landolphioides.*
        - Branchlets shortly puberulous or pubescent.
          - Corolla-tube 2·4–2·6 cm.; leaves truncate at base (ex descr.) 12. *obtusa.*
          - Corolla-tube upwards of 3 cm.; leaves not truncate.
            - Primary peduncles short 13. *angolensis.*
            - Primary peduncles 3–4 cm. long 14. *microdonta.*
- bb. Primary lateral leaf-veins 3–4 on either side of midrib. Corolla-tube glabrous or nearly so externally .... 15. *polita.*
- aa. Calyx-lobes relatively long and narrow, subsetaceous if short; or narrowly lanceolate or oblong-lanceolate or linear oblong.
  - d. Calyx-lobes short, 5–6 mm. at most, unless setaceo-acuminate, then as much as 8 mm.
    - Calyx-lobes filamento-setaceous in the capsular fruit .... 16. *luteola.*
    - Calyx-lobes not filamentous.
      - Ovary and calyx glabrous, or sparsely and interruptedly pubescent; corolla glabrous or scantily pubescent.
        - Stipules ample, over 7 mm. × 5 mm., undivided; inflorescence with long divaricate peduncles .... 17. *perlaxa.*
        - Stipules small, inconspicuous; or divided.
          - Fruit lengthily oblong, about 2 cm. × 6 mm. 18. *stenocarpa.*

Fruit ovoid or ellipsoidal.
Corolla-tube very slender, limb usually much less than 1 cm. diam., fruit dehiscent .... 19. *Monteiroi.*
Corolla-tube not slender, limb 1·5–2·5 cm. or more in diam., fruit indehiscent 20. *arcuata.*
Ovary, calyx and corolla all more or less densely and continuously pubescent or hispidulous.
Leaves rough and hispidulous above... 21. *tenuiflora.*
Leaves smooth and glabrous, or nearly so, above.
Primary peduncles 6 cm. or longer ... 22. *Holstii.*
Primary peduncles 3 cm. or less... 23. *ulugurensis.*
dd. Calyx-lobes attaining 1·5 cm. or more in length.
e. Corolla-limb narrow, rarely more than about 1·5 cm. in diameter, which is usually much less than the tube.
Leaves glabrous, except for a few spreading hairs on the veins; secondary veins few, distant .... 24. *conopharyngiifolia.*
Leaves hairy.
Calyx-lobes subulate-setaceous ...... 25. *Soyauxii.*
Calyx-lobes flat, to 2–4 mm. broad.
Calyx-lobes coloured or tinged with deep red, ovary 2-merous ...... 26. *erythrophylla.*
Calyx-lobes not coloured red, ovary 3-merous 27. *tristigmatica.*
ee. Corolla-limb ample, attaining 3–5 cm. in diameter, which is equal to or greater than the tube.
Leaves smooth and glabrous above, with fine yellowish conspicuous tertiary veins 28. *Zenkeri.*
Leaves hispidulous above, tertiary veins not conspicuous.
Leaves elliptic or oblong, secondary nerves rarely so many as 10 pairs, not glabrous below .... 29. *elegans.*
Leaves broadly lanceolate, secondary nerves 12–16 pairs, glabrous below .... 30. *hispida.*
aaa. Calyx-lobes ample, oblong or ovate, exceeding 1 cm. × 6 mm. 31. *grandiflora.*

The species dealt with below are arranged in the order of their appearance in the preceding key.

1. **Mussænda scabrida** Wernham, sp. nov. Frutex ramulis divaricatis pilis rigidiusculis ferrugineis decurvatis scabridis; *foliis* ellipticis ad obovatis 9–10 cm. × 5·5–7 cm., basi obtusis v. rotundatis, brevissime acuminatis acutis, supra scabridis subtus præsertim in venis hispidulis, venis secundariis utrinque 10–12, petiolo brevissimo hispido, *stipulis* deciduis basi lato, *floribus* . . . *fructu* biloculari indehiscente ellipsoideo breviter rufo-hispido, *calycis* limbo dentibus triangularibus brevibus acutis persistente coronato.

Lagos: Botanical Station, *Millen*, 95! Hb. Kew.

Readily distinguished by the scabrid branchlets and upper leaf-surfaces, and by the short triangular calyx-teeth. The relationship, in the absence of flowers, must remain in doubt.

2. M. RIVULARIS Welw. ex Hiern, Cat. Welw. Afr. Pl. 452 (1898).

Angola: Huilla, in dense forests by cataracts near Lopollo, *Welwitsch*, 1118! Hb. Mus. Brit.

A stout shrub, climbing extensively to a height of 30 ft.

3. M. AFZELII G. Don, Syst. iii. 490 (1834).

Sierra Leone: *Afzelius*! *Don*, 130! et s. n.! *Barter*! *Hart*! *Smythe*, 14! *Smeathmann*! *Scott Elliot*, 4166! South Nigeria: Ibu, *Vogel*, 7! Hbb. Mus. Brit., Kew.

A shrub or tree, reaching about 20 ft. high, growing near streams.

4. M. MONTICOLA Krause in Engl. Bot. Jahrb. xlviii. 406 (1912).

Uluguru: *Holtz*, 1720.

5. **M. Buntingii** Wernham, sp. nov. Frutex ramulis puberulis, *foliis* ellipticis v. oblongis ca. 10–12 cm. × 4·5–6 cm. basi sæpius acutis breviter acuminatis acuto apice, supra scabrello-pubescentibus subtus discoloribus in venis sparse strigillosis aliter nisi minute papillosis glabris, venis secundariis utrinque ca. 12, petiolo gracili puberulo 1–1·5 cm.; *stipulis* diutius persistentibus triangularibus apice bifido ad 4–5 mm. longis; *inflorescentia* trichotoma pedunculis ad 5 cm. longis puberulis, cymulis ca. 6–8-floris; *calycis* ut ovarium sparsiuscule strigillosi lobis brevissimis plerumque triangularibus apice subsetaceo, uno in laminam ovalem petiolo ad 2·5 cm. nonnunquam producto; *corollæ* tubo gracili ad 2·5 cm. vix ampliato, extus insuper sæpius strigilloso nonnunquam glabro, limbo patente 1 cm. diam. excedente lobis ovalibus acutissimis nec acuminatis.

Liberia: Gola, Begwai, in farm-scrub, *Bunting*, 144! Kakatown, *Whyte*! Hbb. Mus. Brit., Kew.

Resembles *M. tenuiflora*, but at once distinguished by the short calyx-lobes.

6. **M. Chippii** Wernham, sp. nov. Frutex ramulis ferrugineo-puberulis; *foliis* ellipticis v. oblongis ca. 10–12 cm. × 5–6 cm., basi brevissime acutis v. subrotundatis, apice breviter acuminatis obtusiusculis, supra aspero-hispidulis subtus in venis strigillosis aliter minute papillosis aliter glabris discoloribus, petiolo dense ferrugineo-pubescente, *stipulis* ad basin in stipellis duobus triangularibus acutis distantibus bifidis; *inflorescentia* 2-plo trichotomis, pedunculis primariis 4–5 cm. longis; *calycis* lobis brevibus triangularibus apiculatis ovarium subæquantibus strigillosis nisi uno in laminam ellipticam candidam petiolo 3·5 cm. longo dilatato; *corollæ* extus sparsissime puberulæ tubo insuper parum ampliato nec gracillimo 2·5 cm. excedente, lobis ovatis brevissime acuminatis acutissimis ca. 4·5 mm. × 4 mm.; *ovario* brevissimo subglabro.

Gold Coast: Amokokrom, W. Apollonia, in tall evergreen forest, *Chipp*, 323! Hb. Kew.

Near the Liberian *M. Buntingii*, but distinct in the relative length of the ovary, &c.

7. M. ABYSSINICA Chiovenda in Ann. Bot. Roma, ix. 67 (1911).

Nubia: Tzellemti, Mai Taclit, abundant in the neighbourhood of the fourth cataract, *Chiovenda.*

Remarkable, according to the description, for its almost complete glabrousness; as well as for being the most northerly-occurring representative of the genus.

8. M. ISERTIANA DC. Prod. iv. 371 (1830). *M. macrophylla* Schum. non Wall. Beskr. Guin. Pl. 118 (1828). *M. Isertiana* var. *laxiflora* Benth. in Hook. Nig. Fl. 393. *M. Isertiana* var. *glabriflora* Hiern in Fl. Trop. Afr. iii. 67.

Sierra Leone: *Don*! Lagos: *Barter*, 3236! *Millen*, 46! S. Nigeria: Oji R., *Kitson*! Brass, *Barter*, 58! Dejema, New Calabar, *Holland*, 126! Bonny, *Kalbreyer*, 221! Eket, *Talbot*, 3000! 3124! Old Calabar, *Holland*, 11! Oban, *Talbot*, 2068! Abbeokuta, *Irving*, 95! N. Nigeria: Bassa, *Elliott*, 94! Fernando Po: *Vogel*, 226! Cameroon R.; *Mann*, 2209! Hbb. Mus. Brit., Kew.

Of variable habit—a shrub or small tree, sometimes scandent.

The very short broad calyx-teeth make this species readily identifiable.

9. **M. brachyantha** Wernham, sp. nov. Ramulis gracilibus pilis deflexis hispidulis; *foliis* sæpius ellipticis ad 13 cm. × 5·5 cm. acuminatis subacutis, supra sparsiuscule scabrellis subtus nisi hic inde in venis pilis paucis conspersis glabris, venis secundariis utrinque 12–15, petiolo ad ca. 1·5 cm. longo, *stipulis* lanceolatis acuminatis apice bifido; *inflorescentiæ* pedunculis primariis ad ca. 2 cm. dense rufo-pubescentibus; *calycis* lobis a basi latiusculo lanceolatis acuminatis acutis ca. 4 mm. longis extus dense rufo-pilosis; *corollæ* tubo vix 2 cm. longo insuper parum ampliato, extus pilis nisi inferioribus nonnunquam deflexis ascendentibus dense pubescente, limbo vix 1·2 cm. diametro patente, lobis ovatis apice apiculatis acutissimis.

Liberia: Gola, Begwai, *Bunting* 147! Hb. Mus. Brit.

Near *M. landolphioides*, but distinct in the short corolla, with relatively broader limb.

10. M. AFZELIOIDES Wernham in Cat. Talb. Nig. Pl. 40 (1913).

S. Nigeria: Oban, *Talbot*, 212! 275! Hb. Mus. Brit.

A climbing shrub.

11. **M. landolphioides** Wernham, sp. nov. Frutex verisimiliter scandens ramulis novellis pilis longiusculis ferrugineis deflexis dense hirsutis tardiuscule glabrescentibus; *foliis* oblanceolatis v. ellipticis ad ca. 13 cm. × 5 cm. basi rotundatis v. subtruncatis acuminatis acutis, supra hispidulis subtus nisi in venis sparse patente pilosis glabris, margine ciliato, venis secundariis utrinque ca. 12, petiolo ad 1·5 cm. longo, *stipulis* triangularibus apice bi-setaceis extus dense ferrugineo-pilosis; *inflorescentia* densiuscula trichotoma omnino dense ferrugineo-hispidula, *bracteis* setaceo-subulatis, *pedunculis* primariis ca. 4 cm. longis; *calycis* lobis brevibus triangularibus acutissimis extus hispidulis, uno nonnunquam in laminam petiolatam aucto; *corollæ* tubo parum ampliato 2·5–3 cm. longo extus dense pilis adscendentibus

v. patulis hirsuto, limbo 5–6 mm. lato lobis brevissimis suberectis setaceo-apiculatis.

Lagos: Ibadau, *Foster*, 157! *Millen*, 100! Hb. Kew.

Readily distinguishable by the rather long narrow leaves, and hairy slender corolla with very narrow limb.

12. M. OBTUSA Krause in Herzog zu Meckl. Zent.-Afr. Exped. 315 (1911).

Aruwimi: *Mildbraed*, 3171.

An undershrub, about 5 ft. high.

13. **M. angolensis** Wernham, sp. nov. Ramulis dense pubescentibus, *foliis* ellipticis ca. 10 cm. × 6 cm. vix acuminatis basi acutis apice subobtuso, utrinque hic inde pilis paucis hirtellis præcipue in venis conspersis aliter glabris venis secundariis utrinque 10–12, petiolo ca. 1·2 cm. longo; *inflorescentia* densiuscula, pedunculis primariis brevibus; *calycis* lobis breviter lanceolatis ca. 3 mm. longis acutis, extus flavo-hispidulis; *corolla* extus pilis appressis nisi infra deflexis ascendentibus pubescente, tubo angusto insuper parum ampliato 3·5 cm. excedente, lobis lanceolatis acutis 7–8 mm. longis patentibus.

Angola: Long. 15° 5′ E., lat. 12° 44′ S., 4340 ft., *Wellman*, 1800! Hb. Kew.

Near the Liberian *M. brachyantha*, but readily distinguished by the longer corolla, &c.

14. **M. microdonta** Wernham, sp. nov. Ramulis quadrangularibus novellis compressis obscuriuscule appresse pubescentibus; *foliis* oblongis v. late ellipticis ca. 16 cm. × 9 cm., utrinque angustatis, utrinque nisi in venis appresse puberulis subglabris, venis secundariis paribus ca. 12, petiolo vix 1·5 cm. sparsim puberulo, *stipulis* caducissimis; *inflorescentia* laxiuscula trichotoma pedunculis primariis complanatis appresse pubescentibus 3–5 cm. longis, *bracteis* parvis setaceis vix 3 mm. longis; *calycis* dentibus 2 mm. longis rigidiusculis subpatentibus setaceo-subulatis acutissimis; *corollæ* extus dense appresse pubescentis tubo ad 3 cm. gracili insuper parum ampliato, lobis ovatis brevissime setaceo-apiculatis; *ovario* calycis lobos duplo superante, densiuscule sed minute appresse puberulo.

German East Africa: Usambara, *Buchwald*, 431! Hbb. Mus. Brit., Kew.

15. M. POLITA Hiern in Fl. Trop. Afr. iii. 67 (1877).

S. Nigeria: Calabar, *Williams*, 25! 26! 36! Cross River, *Holland*, 228! Cameroon: Efulen, *Bates*, 430! Lolodorf, *Staudt*, 351! W. Africa, lat. 1° N. Mt. John, R. Kongin, *Mann*, 1799! Gaboon: Sibange Farm, Munda, *Soyaux*, 13! Hbb. Mus. Brit., Kew.

A glabrous, shining, spreading, or scandent shrub, or a small tree.

16. M. LUTEOLA Delile, Cent. Pl. Afr. Cailliand, 65, t. 1, f. 1 (1826). *M. ægyptiaca* Poir. in Lam. Encyc. iv. 394. *M. lanceolata* Spreng. Syst. i. 705.

Mittu-land: *Schweinfurth*, 2855! Nile-land: *Freeman & Lucas*, 1! *Petherick*! *Speke & Grant*, 669! Lake Rudolf: *Wellby*! Uganda: Waki R., 2800 ft., *Bagshawe*, 834! Entebbe, *Fyffe*, 130! at 4000 ft., *Dawe*, 630! Hbb. Mus. Brit., Kew.

A small erect shrub with pubescent branchlets; it is frequently cultivated. Readily recognized by the almost filamentous fruiting calyx-lobes.

17. **M. perlaxa** Wernham, sp. nov. Frutex scandens ramulis sparsim pilis patentibus indutis; *foliis* ca. 16 cm. × 8·5 cm. ellipticis utrinque angustatis, supra glabrescentibus subtus præcipue in venis puberulis, venis secundariis subtus prominulis utrinque ca. 10–12, petiolo sparsissime piloso ad 4 cm. longo, *stipulis* amplis glabratis ad 1 cm. × 9 mm. obtusis; *inflorescentia* trichotoma cymulis paucifloris pedunculis elongatis ad 7 cm.; *calycis* lobis linearibus acutis ad ca. 3 mm. longis extus in vena mediana strigillosis, uno in laminam breviter petiolatam suborbicularem utrinque nisi dorso in venis minute strigillosis glabram nonnunquam dilatato; *corollæ* tubo pro genere brevi 1·5–1·7 cm. longo extus insuper sparse strigilloso basin versus glabrato, lobis late triangularibus suberectis brevissimis; *ovario* peranguste infundibulari in pedicellum brevissimum angustato.

Zanzibar: *Kirk*! Hb. Kew.

Remarkable for the long leaf-stalks, the stipules, and lax straggling few-flowered inflorescences! A plant collected in the Nyika country by the Rev. T. Wakefield (Hb. Kew), bearing fruits but no flowers, is probably referable to the same species. The fruits are glabrous and oblong, 2·3 cm. long and 7 mm. in the widest part.

18. M. STENOCARPA Hiern in Fl. Trop. Afr. iii. 68 (1877).

Monbuttu-land: near Munsa, *Schweinfurth*, 3362! Hb. Kew.

A small shrub, notable for its oblong fruit, as much as ¾ in. long.

19. **M. Monteiroi** Wernham, sp. nov. Frutex sparse ramosus. ramulis rectis virgatis, novellis sparse et minute puberulis mox glabrescentibus; *foliis* membranaceis pro genere inter minima 5–6 cm. × 1·5–2·8 cm., utrinque angustatis obtusiusculis, supra sparsissime hirtellis subtus nisi in venis puberulis glabris, venis secundariis utrinque 4–5 reticulo tertiario manifesto, petiolo tenero brevi, *stipulis* a vagina brevissima breviter 2-apiculatis; *inflorescentiis* trichotomis ramulis puberulis, *bracteis* brevibus subsetaceis, cymulis 6–8-floris; *calycis* lobis sparse hirtellis ad 2·5–3 cm. longis angustis subsetaceis, uno nonnunquam in laminam ellipticam candidam utrinque glaberrimam petiolo vix 2 cm. dilatato; *corolla* extus sparse puberula gracili insuper parum ampliata ad 2–2·5 cm. longa, limbo 8–9 mm. diam. lobis apiculato-acutis; *fructu* breviter oblongo-ellipsoideo ca. 7 mm. × 4·5 mm. glabro loculicide ab apice dehiscente.

Angola: *Gossweiler*, 563! In rocky thickets, Anha-Benguella, *Gossweiler*, 4273! Boma, *Monteiro*! Hbb. Mus. Brit., Kew.

Remarkable for the small thin leaves and dehiscent fruit; the characters of the latter distinguish this species from *S. stenocarpa*, the nearest ally.

(To be concluded.)

CARNARVONSHIRE PLANTS.

By Spencer H. Bickham, F.L.S., Rev. E. S. Marshall, M.A., F.L.S., and W. A. Shoolbred, M.R.C.S., F.L.S.

We spent about three weeks of July, 1912, together at Capel Curig, Rev. E. F. Linton being also a member of our party for ten days. The season was very unfavourable; before our arrival there had been six weeks of almost complete drought, which was soon followed by three or four broiling hot days: then came torrential rains, and, when these ceased, easterly winds prevailed, accompanied by dense mist. Under such circumstances very little work could be attempted on the higher hills; and the vegetation of the valleys (not specially rich in the district) was rather backward and stunted: this applies particularly to the *Rubi*, which are numerous and interesting, but were mostly unfit for collecting. A few apparently unrecorded plants (starred) were observed; also some others in stations not mentioned in Mr. J. E. Griffith's *Flora of Anglesey and Carnarvonshire* (1895).

Thalictrum majus Crantz. Very scarce on the cliffs of Cwm Idwal, above 2000 ft.; strikingly different from *T. minus* L. (*collinum* Wallr.), with which it is here associated, by its robust habit, larger, more entire leaflets, and much longer, simple pedicels; it also flowers a little later, and no trace of fruit was to be found on July 13th.

Trollius europæus L. Sparingly near the head of Llyn Crafnant.

[*Meconopsis cambrica* Vig. By an odd slip, this is ranked as an alien in the *Flora*.]

Corydalis claviculata DC. Near Capel Curig, and on a cottage roof at Hendre, above Llyn Crafnant.

Fumaria Bastardi Boreau (*confusa* Jord.). In cultivated ground at Trefriw.

Polygala oxyptera Reichb. In good quantity, and often very fine, on a roadside bank between Bettws-y-Coed and Capel Curig, near the Swallow Falls.—The large-flowered Milkwort of the Cwm Idwal cliffs, referred to by Mr. Druce in Journ. Bot. 1902, pp. 182–3, where he places it as a form of *P. vulgaris* L., and mentions that Herr Freyn said it approached *P. Saltelii* Legrand, "sed erectior, floribus majoribus," appears to us to belong rather to *P. serpyllacea* Weihe; this species is frequent on mountains, but restricted *P. vulgaris*, according to our experience, is usually a low-ground plant. We did not see the Cwm Idwal form in fruit, and unfortunately omitted to send home roots. It should be tested by cultivation, as it is, at least in the wild condition, most remarkable and handsome.

Silene nutans L. In fair quantity on the hill above Deganwy Castle ruins.

Arenaria leptoclados Guss. Very characteristic, on a wall-top at Gogarth, Great Orme's Head.

Hypericum maculatum Crantz (*dubium* Leers). Abundant about Capel Curig, especially by roadsides.

Geranium Robertianum L. var. **modestum* (Jord.). A pretty form, found on walls near Cobden's Hotel, Capel Curig, seems to come under this: petals small, their blade about as long as the claw; sepals glabrescent, sometimes with a few sessile or shortly stalked glands (colour of anthers not noted, but probably purplish).

Rubus lentiginosus Lees (*cambricus* Focke). Gathered in good quantity by S. H. B. at Capel Curig, its original station.

Alchemilla vulgaris L. The handsome plant of the cliffs near Twll Du is confirmed by Mr. Linton as *A. alpestris* Schmidt, which probably represents the Linnean type.

Rosa agrestis Savi (*sepium* Thuill.), var. One very dwarf, browsed bush, by the road round the Great Orme's Head, near Gogarth. Flowers small, white; fruit globose; leaves with appressed hairs on the upper surface, densely hairy and glandular beneath, with extremely fine, acute, compound, forward-pointing teeth. Perhaps a new British form.

Pyrus Aria Ehrh. All the Great Orme's Head trees or bushes which we saw appeared to be Syme's subspecies *P. rupicola* = *Sorbus salicifolia*; Mr. Griffith only cites this as growing at Bangor.

Cotoneaster integerrima Medic. A new station was found in a limestone "pavement" not far from the Great Orme Lighthouse, where two or three very small specimens occurred. It has been suggested (we believe by Mr. F. N. Williams) that this rarity may not be indigenous, but bird-sown from gardens at Llandudno; but it was far more plentiful forty-five years ago, when the place was a mere fishing village; and S. H. B. knows that such bushes as now occur in the town and cliff gardens were imported from the cliffs or rocks. The existence of such native outliers is hard to account for, but cannot be explained away on *a priori* grounds.

Saxifraga hypnoides L. In Cwm Idwal grow various intermediates, apparently hybrids and mongrels, between this and a very pretty, subglabrous, vivid green form or variety of *S. sponhemica.*

Drosera longifolia L. (*intermedia* Drev. & Hayne). In a bog near the head of Llyn Crafnant, very local; boggy meadow, Capel Curig.

Epilobium obscurum Schreb. Though classed as "rather rare" in the *Flora*, this is frequent about Capel Curig, and doubtless elsewhere in the county.—*E. obscurum* × *palustre.* Boggy meadow, Capel Curig.—*E. alsinefolium* Vill. Cwm Idwal, at 2000 ft.

Hieracium Schmidtii Tausch. A peculiar form, with yellow styles and rather *floccose* heads, is referred to this by Mr. Linton; it grew sparingly beyond Ogwen Cottage, on rocks near the bridge, above the Falls of the Ogwen. Mr. Griffith notes that the Cwm Idwal form, which we failed to see, has livid styles; but the species is variable in this respect.—*H. argenteum* Fr. A few stylose specimens were gathered in Cwm Ffynnon Lloer, at 2000 ft.; it is typical in Cwn Tryfan, and on the bridge near Ogwen Cottage.—*H. Sommerfeltii* Lindeb. A beautiful form of this was found on rocks above the tarn called Fynnon Lloer; the leaves have larger and more numerous blotches than usual, and the ligules are copiously ciliate with *long* hairs, but Mr. Linton does not separate it from the type.—*H. hypochæroides* Gibs. var. **saxorum* F. J. Hanb. The most abundant hawkweed in Cwn Idwal, where it often clothes the almost inaccessible cliffs, ranging from 1800 to 2300 ft. or more. The leaves are firm, bluish-green or glaucous, usually (but by no means always) spotted; styles pure yellow. Allowing for reduction in size, due to a subalpine situation, this agrees well with specimens from near Auchterneed, E. Ross, &c. We suspect that it is the Cwm Idwal '*Sommerfeltii*' of the *Flora*, as no true *H. Sommerfeltii* was met with there; but both may occur.—*H. sciaphilum* Uechtr. Frequent and variable, about Capel Curig; a very large state was found by the Llugwy, and on slate *débris* at Dolwyddelan railway station.—Var. **transiens* Ley.? This name is suggested by Mr. Linton for a peculiar plant, with lemon-yellow ligules (slightly ciliate-tipped), glandular, floccose, but almost epilose heads, and unusually small foliage, found beside the road from Capel Curig to Penygwryd; we believe it was also seen at Hendre, near Llyn Crafnant, only in bud, and therefore not gathered. Possibly a new and distinct variety.—*H. diaphanoides* Lindeb. Wall-tops, Capel Curig; rocks near Ogwen Cottage; stream-sides, &c., in the Pass of Llanberis; also, unusually luxuriant, on slate *débris* at Dolwyddelan.—Var. *ornatum* Dahlst.? On large boulders of volcanic ash in Cwm Idwal, from 1250 to 1750 ft. Perhaps owing to the situation, or the dry early summer, or both, the leaves were mostly tinged with purple (often almost black); the more or less floccose phyllaries also distinguish it from type. Mr. Linton, who suggested the name, thinks that this is the plant referred to in his brother's *British Hieracia*, p. 70; indeed, we saw nothing else to which the note could apply.—*H. gothicum* Fr. A yellow-styled form of this (confirmed by Mr. Linton) grows in plenty by a tributary of the Llugwy, most likely the Nant-y-Waen, nearly two miles above Capel Curig; it varied very much in size and leaf-cutting, but was evidently all one thing. Small specimens are often 1- to 3-headed; one large example bears twelve heads.—*H. stictophyllum* Dahlst. In three distinct stations near Capel Curig; yellow-styled, as is often the case in Scotland. This is the *H.* '*sparsifolium*' of the *Flora*, which used the name accepted at that time.—**H. sparsifolium* Lindeb. var. *placerophyllum* Dahlst. On a bank near the Llugwy, above Capel Curig; extremely scarce. It is practically identical with specimens from W. Yorks and E. Perth, and differs greatly from *H. gothicum*, *latifolium*, to which Mr. Linton—who does not know *placerophyllum*—was disposed to assign our specimens, in habit, foliage, head-clothing, darkened styles, &c.—*H. corymbosum* Fr., *type. Rocky bank of the Llugwy, a little above Capel Curig Church; rather small and young, but characteristic. Mr. Linton concurs.

**Taraxacum spectabile* Dahlst. Cwm Idwal, already past flower at 2000 ft. on June 26th; leaves more or less spotted.

Myosotis repens. Though called "rare" in the *Flora*, this is common enough on the uplands near Capel Curig, especially in Glan Llugwy.

Euphrasia scotica Wettst. Wet bogs, Capel Curig, and near the head of Llyn Crafnant.

Melampyrum pratense L. var. *hians* Druce. This beautiful variety was alone observed; it is abundant in open woods and bushy places about Capel Curig.

Orobanche Hederæ Duby. Deganwy Rocks; only one plant was seen.

Orchis ericetorum Linton. Very common on wet moors and in damp pastures.—Restricted *O. maculata* L. was only met with on the Great Orme limestone.

Habenaria virescens Druce (*chloroleuca* Ridley). Between Capel Curig and Dolwyddelan; also near Llyn Crafnant.

Sparganium affine Schnizl. In the lower lake, Capel Curig, opposite the Hotel.

Potamogeton polygonifolius Pourr. Llyn Ogwen, in profusion.

Scirpus pauciflorus Lightf. Bog near Llyn Crafnant; *Eriophorum vaginatum* L. and *Carex dioica* L. grow close by.

Rynchospora alba Vahl. Between the road and the lake, close to Capel Curig Hotel.

Carex fulva Host (*Hornschuchiana* Hoppe). Not uncommon; the hybrid with *C. Oederi* Retz. var. *œdocarpa* And. was found above Llyn Crafnant.

Dactylis glomerata L. The Great Orme's Head plant which has been called var. *congesta* Gren. & Godr. proves to be (as we supposed, before seeing it alive) a mere state, due to the local conditions, and quite unworthy of a special name.

Festuca rottbœllioides Kunth (*Poa loliacea* Huds.). On a wall near Gogarth, Great Orme's Head.

Hymenophyllum tunbridgense Sm. Locally abundant on boulders in an oak wood, Capel Curig.

MISCELLANEA BRYOLOGICA—I.

By H. N. Dixon, M.A., F.L.S.

Tetraphidopsis Broth. & Dixon.

This genus was founded (Journ. Linn. Soc. Bot., xl, 451, t. 21) on a New Zealand moss, *T. novæ-seelandiæ*, sp. nov., collected by Mr. W. Gray at Mauriceville, Wairarapa, North I. I have recently, in working at New Zealand Bryology, had occasion to enquire what was *Meteorium pusillum* H. f. & Wils. (Fl. N. Z., ii. 101, t. 88). No specimens were to be found at Kew, nor in the general collection at the British Museum; but on referring to Wilson's herbarium the plant was found, a "scrap only," as Wilson describes it in his notes, labelled "Colenso, 484 & 484 b." To my surprise I at once identified it as our *Tetraphidopsis*. It is not, perhaps, remarkable that this plant was overlooked by

Brotherus and myself, seeing that, in all probability, it exists nowhere outside of Wilson's herbarium; that the figure in Fl. N.Z. represents the capsule as *smooth*, no doubt drawn in the moist condition (it is described as sulcate in the text); that no mention is made of the gemmæ, which in Mr. Gray's specimens are the most conspicuous feature of the plant, and that the moss is in no way a *Meteorium*, and was, therefore, not likely to be looked for under that genus. It is, however, absolutely identical, and Colenso's specimen was gathered also in the Wairarapa district. Our moss must therefore stand as *Tetraphidopsis pusilla* (H. f. & W.) Dixon.

The male inflorescence has not, I believe, been described. Mr. Gray has recently sent me further specimens, among which I have detected a few male plants. The male flowers are *terminal* on the ordinary branches, a very unusual situation in the Pytchomniaceæ and allied orders; gemmiform, comparatively large, and brownish; the outer bracts rather large, and pointed like the normal leaves, the inner gradually shorter and more obtuse, the interior laxly areolate, widely convolute, very broadly ovate or suborbicular, and quite obtuse. Antheridia few (about 7), pale, with scarcely any paraphyses.

DITRICHUM BRACHYCARPUM Hampe.

In working out the New Zealand species of *Ditrichum*, the above plant came under my notice. The synonymy appears to have become curiously confused. Paris Ind. Suppl. p. 130, has—

"DITRICHUM BRACHYCARPUM Hpe.
Anisothecium ferrugineum Mitt. in Trans. and Proceed. of the Roy. Soc. of Victoria, 1880,* *p.* 57.
Leptotrichum ferrugineum ej. in Fl. Tasman. II, *p.* 171.
2. Terr.—*Pac.* Tasman."

In the second edition it appears as follows—

"DITRICHUM BRACHYCARPUM *Hpe. in Linn.* 1871–73, *p.* 514.
Anisothecium ferrugineum Mitt. in Trans. and Proceed. of the Roy. Soc. of Victoria, 1880,* *p.* 57.
Leptotrichum brachycarpum† *ej. in Fl. Tasman. II*, *p.* 171 (1860).
2. Terr.—*Pac.*: Austral. or. (Victoria),‡ Tasman."

I do not know on what grounds Paris makes *Anisothecium ferrugineum* Mitt. a synonym of *D. brachycarpum*. It is possibly through some *lapsus calami*. In any case the Tasmanian *Blindia ferruginea* (Mitt.) Broth. is a totally different plant, and has nothing to do with *D. brachycarpum* Hampe, and Tasmania should be expunged from the synonymy in the Index.

Watts and Whitelegge (Census Musc. Australiens.), following

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* This should read 1882–3.

† A slip for *ferrugineum.*

‡ Error for N.S.W.

Paris, have transferred *D. brachycarpum* Hampe to the synonymy of *Blindia ferruginea.* They also give—

"186. D. BRACHYCARPUM C.M., Symb., No. 166; *L. cylindricarpum* Hpe. N.S.W., Blue Mts.: F. v. M., '72.
D. brachycarpum, Hpe. See No. 220 (*Blindia ferruginea*).
D. cylindricarpum, Hpe. See No. 186."

From this it would seem that *D. brachycarpum* C.M. in Hedw., 1898, p. 112 (Symbolæ ad Bryol. Austral.) was a different plant from Hampe's species of the same name. This, however, is not the case. I have examined the types of both plants in Hampe's and C. Müller's herbaria. They are identical, and represent the same gathering, "N.S.W., Blue Mts., F. v. Müller." Probably C. Müller had his specimen labelled with the name *D. brachycarpum*, and forgetting that it was Hampe's name and had already been published by him, described it as his own species in the Symbolæ (Hedw., 1898).

I have not examined *D. cylindricarpum*, either of Hampe or C. Müller, and am unaware how far they should figure in this synonymy, which should read as follows—

DITRICHUM BRACHYCARPUM Hampe in Linn., 1872, p. 514.
Syn. *Leptotrichum brachycarpum* C.M. in Hedw., 1898, p. 112.
Distr.—Australia (N.S.W.).

WEISIA WELWITSCHII Schimp. Syn. Ed. 2, p. 52.

Limpricht (Laubm. III, 682) gives *Weisia welwitschii* Schimp. as a synonym of *Campylostelium strictum* Solms.; in this he has been followed by all or most subsequent authors. He does not give his authority for the reduction, nor does he mention having himself examined Welwitsch's plant.

Having occasion recently to study *C. strictum*, I examined Welwitsch's plant in Schimper's Herbarium at Kew ("346, ad cataractas, Sa. de Cintra, Maio, 1849"). There is an extremely close resemblance between the leaves of the two plants, but a closer examination, especially of the fruit, shows that they are perfectly distinct.

In the first place, *C. strictum* is a dark green plant of hard granite rock, while the *Weisia* is a bright green moss, growing on very distinctly calcareous, white and chalky-looking soil. The areolation of the leaves, while superficially similar, is less so when carefully examined. In the *Campylostelium* the cells are in two strata at margin for a great part of the lamina (as in *C. saxicola*), incrassate, not crowded, and the hyaline cells at base occupy a very short space. In *W. Welwitschii* the cells are comparatively thin-walled and therefore closer, chlorophyllose, and in one layer throughout; and the hyaline basal cells occupy a considerably larger area of the leaf. The nerve, also, is wider and more solid in the *Weisia*.

The capsule in the *Weisia* is quite different, short, elliptical, slightly asymmetrical, very different from the subcylindrical, exactly symmetrical, pachydermatous capsule of *C. strictum*, which, moreover, is nearly always distinctly, though lightly, plicate when dry. The exothecium cells are quite distinct, somewhat widely elliptical or rhomboid-hexagonal in the *Weisia*, with thin walls; much narrower—elongate rectangular—with very thick walls in the *Campylostelium*. The latter, also, has a broad annulus, of which I could find no evidence in the *Weisia*, though I cannot vouch for its absence.

Finally, the peristome in the two mosses differs *toto cælo*. In the *Campylostelium* it is characteristic of the genus, the teeth divided into long, filiform crura, densely papillose below, smooth above. In Schimper's species they are short and irregular, broad, scarcely divided, remotely and thinly transversely barred, smooth or almost so; in fact, entirely Weisioid.

W. Welwitschii is, in short, a good species. Roth suggests identity with *Eucladium verticillatum* var. *angustifolium*, but the leaf base is quite different. It is more like *Gyroweisia linealifolia* Kindb., but that, *inter alia*, is gymnostomous, and has more highly papillose leaves.

A NEW ALPINIA FROM BORNEO.

By H. N. Ridley, C.M.G., F.R.S.

Alpinia longilora, n. sp. Folia lanceolata caudata glabra costa subtus pubescente excepta, 16 cm. longa ·2 cm. lata, petiolo brevissimo 3 mm. longo hirto, ligula glabra brevi emarginata, dentibus brevibus duobus. Panicula decurva glabra 6 cm. longa. Flores bini in pedunculis brevibus 3 mm. longis, pedicellis æquilongis. Bractea spathacea ovata oblonga apice rotundata lata, margine scariosa glabra ·15 mm. longa 10 mm. lata caduca. Calyx cylindricus gracilis, obscure bilobus lobis brevissimis ovatis, uno latere emarginatus. Corollæ tubus gracilis 15 mm. longus, lobi lineares oblongi undulati 15 mm. longi, 5 mm. lati. Labellum stamine ad basin adnatum ungue elongato lineari canaliculato antheram superante, in medio incrassato marginibus tenuioribus, limbo lineari-lanceolato latiore, abrupte deflexo profunde bifido, lobis lanceolatis undulatis undique glabrum, basi unguis hirto excepto. Stamen, filamento brevi in unguis basi involuto et eo adnato, anthera breviore quam unguis oblonga, connectivo elongato lineari-lorato parce ad basin hirsuto.

Sarawak, Puak; *C. J. Brooks*.

This curious *Alpinia* belongs to the section *Cenolophon* with crested anthers, a section more abundant in Borneo than elsewhere. The peculiar adnation of the filament to the claw of the lip is very unusual in the genus, and the very long strap-shaped prolongation of the connective is also a very distinctive character.

LICHENS OF ARRAN (v.-c. 100).

By J. A. Wheldon, F.L.S., and W. G. Travis.

There appears to be very little in print to indicate to what extent the lichens of Arran have hitherto been investigated. Beyond the mention in Leighton's *Lichen Flora of Great Britain* and Crombie's *Monograph of British Lichens*, of Arran localities for a few lichens, mostly gathered by Prof. J. H. Balfour, of Edinburgh, we know of no published record of earlier work.

Our paper includes these records, and also the results of field-work done by one of us in July, 1910, and by Mr. Wm. West, F.L.S., in August of the same year. On hearing that we were working at the lichens of the island, Mr. West kindly placed at our disposal a mass of material collected by him. His gatherings, which were particularly rich in corticolous species, have, on examination, yielded many interesting lichens; and we are much indebted to him for allowing us to supplement our list so materially by the inclusion of particulars of his finds. It may be added that some of the material collected has been distributed through the Lichen Exchange Club, and was referred to in the Report of the Club for the year 1911.

It should be explained that practically the whole of the field-work was done on the coast, little or nothing being done on the mountains, owing, to some extent, to inclement weather. The eastern side of the island, from Corrie to Lamlash, received most attention; but some collecting was also done on the western coast between Drumadoon Point and Tormore, and on the south coast in the neighbourhood of Bennan Head and Kildonan. The corticolous species were mainly gathered in the woods about Brodick and Corrie, and in the lower wooded portions of Glen Rosa, Monamore Glen, and other glens opening to the east coast.

In Arran lichens are abundant and in fine condition on the shore-rocks; and most of the saxicolous species in our list were collected on the coast, more especially at Corriegills, just south of Brodick. The outcropping rocks on the shore there are mainly of sandstone and conglomerate, but are intersected by numerous dykes of igneous rocks.

A note was taken, so far as practicable, of the kind of rock on which the saxicolous species were met with, with a view of ascertaining to what extent they exhibit a preference for a particular type of rock substratum. The data obtained are hardly sufficient to warrant more than a brief reference to the subject.

Many of the silicicolous lichens were found to occur indifferently, as might be expected, on siliceous sedimentary rocks (sandstones and conglomerates) as well as on some of the acid igneous rocks. Thus, on sandstone rocks on the shore at Corriegills the following lichens were noted as common:—*Physcia aquila*, *Xanthoria parietina*, *Lecanora parella*, *L. atra*, *Verrucaria maura*, *Callopisma ferrugineum* var. *festivum*, *Lecanora campestris*, *Ramalina cuspidata*, *Physcia stellaris*, *P. tenella*, and *Placodium tegularis*. These lichens constitute the principal components of a well-marked lichen-association on the barer sandstone rocks just above high-water mark. Most of the foregoing species were also noted on quartz-porphyry, an acid igneous rock which is very prominent at Drumadoon Point and other localities on the Arran coast. A few species were found to occur not only on sandstone and acid igneous rocks, but also on igneous rocks of basic type, *e.g.*, basalt, but unfortunately the lichen-flora of the basic rocks was not sufficiently examined to yield data for comparative purposes. It may be mentioned that certain lichens (e. g., *Verrucaria nigrescens*, *V. maculiformis*, *Placodium tegularis*, and *P. lobulatum*), which in many parts of the country are restricted to calcareous rocks, were observed on siliceous rocks on the Arran coast. From this it would appear that these exposed, spray-washed maritime rocks afford the requisite xerophytic conditions which in other districts are only furnished by limestone, and the chemical composition of the substratum does not come into question in these cases. As bearing on the question of the part played by the texture or grain of a rock-surface so far as some lichens are concerned, it may be mentioned that on the Arran coast the sandstone, when adjacent to intrusive igneous rocks, is usually close-grained and indurated, and that several species, e. g., *Lecanora squamulosa*, *L. picea*, *Lecidea rivulosa*, and *Rhizocarpon petræum*, were found on this type of rock, and were not seen on the unaltered sandstone. The coarse conglomerates, such as are met with near Corrie, are poorer for lichens than the sandstones, this being probably due to the fact that when the sandstone matrix weathers, a very uneven surface, mainly consisting of quartzose pebbles, results. The granitic rocks were not much examined, but at the lower elevations, at all events, the granite is characterized by a paucity of species; on the exposed crags of the high peaks, however, some of the boreal lichens found on other Scotch granite mountains may be expected to occur.

In the following list, one hundred and nineteen species of lichens are enumerated. It must be understood, however, that our list does not at all pretend to represent the lichen-flora of the island: it is simply a catalogue of the lichens collected and observed during a holiday visit, supplemented by a few previously published records which have come under our notice.

Lichina confinis Ag. On sandstone rocks at tide-level, Corriegills. A form also occurs in the same locality, on boulders well above high-water mark, in which the spores are monostichous, but slightly different in shape and measurement from the normal (16·5–19·5 × 13·2 μ).

Collema furvum (Ach.) var. *tunæforme* Nyl. On sandstone, Corriegills shore.—*C. pulposum* (Ach.) *c. frt.* Among mosses, on earth, Corrie, *West.*

Synechoblastus nigrescens (Ach.). On an ash, Monamore Glen, *West.* A more divided form than usual, and, perhaps, may be a distinct variety.

Leptogium lacerum Gray. Among mosses, on shady rocks, Corrie, *West*.—*L. pulvinatum* Nyl. On mossy boulders, Corriegills.—*L. scotinum* Fr., *c. frt.* On the ground among mosses, Corrie, *West*; on mossy boulders, Corriegills.

Stictina fuliginosa Nyl. Corrie, *West*.

Lobaria pulmonaria Hoffm. "Arran," Prof. Balfour, Leighton's *Lichen-Flora*.

Peltigera canina and *P. polydactyla* Hoffm. "Arran," Prof. Balfour, Leighton's *Lichen-Flora*, p. 102–3.—*P. rufescens* Hoffm. On the sandy shore by the mouth of the Rosa burn.—*P. horizontalis* Hoffm. "Arran," Prof. Balfour; Corrie, and among mosses on rocks, Monamore Glen, *West*; on sand-dunes at Blackwater Foot.

Sphærophorus coralloides Pers. "Arran," Prof. Balfour; on peaty soil, near Brodick; Monamore Glen, *West*.

Ramalina farinacea Ach., *c. frt.* On bark, common.—*R. scopulorum* Ach. "Arran," Prof Balfour; on quartz-porphyry, at sea-level, Bennan Head.—*R. cuspidata* Nyl., *c. frt.* On sandstone, Corriegills shore; very fine on quartz-porphyry at Drumadoon Point.

Usnea florida var. *hirta* Hoffm. Common on bark. — *U. ceratina* Ach. On alder, near Lamlash, *West*; on the bark of trees, Brodick.

Cetraria aculeata Fr. On the sandy shore, Invercloy; probably common.

Platysma glaucum Nyl. Common on bark and on rocks.

Evernia prunastri Ach. On bark, common.

Parmelia perlata Ach. On the bark of sycamores, Lamlash, and also near Corrie, *West*; on bark, Brodick.—*P. ciliata* Nyl. Among mosses, Corrie, *West*.—*P. cetrarioides* Nyl. On sycamore bark, Lamlash, *West*.—*P. saxatilis* Ach. Common on bark and on rocks.—*P. sulcata* Tayl. Lamlash, *West*.—*P. omphalodes* Ach. Common, on granite and pitchstone.—*P. Borreri* Turn. On bark, near Brodick and Lamlash, *West*.—*P. caperata* Ach. On maritime rocks, King's Caves.—*P. sinuosa* Ach. Brodick Castle, Sir W. J. Hooker, Leighton's *Lichen-Flora*. — *P. olivacea* Ach. Corrie, sparingly in fruit, and also at Lamlash, *West*.—*P. exasperata* Nyl. On alder, Corrie, *West*.—*P. fuliginosa* Nyl. Common both on bark and rocks (noted on granite and pitchstone).—*P. physodes* Ach. Common on bark, especially on birches.

Xanthoria parietina Th. Fr., *c. frt.* Common on the shore-rocks; noted on sandstone and quartz-porphyry.

Physcia pulverulenta Nyl. var. *subvenusta* Nyl., *c. frt.* On the bark of ash, Lamlash, *West*.—*P. pityrea* Nyl. f. *flavescens*. On ash, Benlister Glen, *West*.—*P. aquila* Nyl., *c. frt.* Abundantly, on sandstone rocks, Corriegills shore; also on quartz-porphyry, Bennan Head.—*P. stellaris* Nyl. var. *leptalea* Nyl. Common on sandstone rocks, Corriegills. — *P. tenella* Nyl., *c. frt.* Common, along with the next preceding, on sandstone rocks, just above high-water mark.—*P. cæsia* Nyl. On bark, Lamlash, *West*.

Placodium tegularis Nyl., *c. frt.* Frequent on the coastal rocks, occurring on sandstone, Corriegills, and on basaltic dykes on the shore at Kildonan.—*P. lobulatum* Hepp., *c. frt.* On quartz-porphyry, Bennan Head.

Callopisma vitellinum Sydow. On bark, near Corrie, *West.*—*C. citrinum* Koerb., *c. frt.* On sandstone rocks, King's Caves.—*C. ferrugineum* Mudd, var. *festivum* Nyl. On sandstone rocks on the shore, Tormore, and at Corriegills; on quartz-porphyry, Bennan Head.

Lecanora irrubata Nyl., *c. frt.* On limestone, Corrie.—*L. subfusca* Nyl., var. *campestris* Nyl., *c. frt.* Common on sandstone, Corriegills shore.—*L. allophana* Nyl., *c. frt.* On ash, Lamlash; also at Corrie, and near Brodick, *West*; on birch bark, North Sannox Glen.—*L. Parisiensis* Nyl., *c. frt.* On alder, Lamlash, *West.*—*L. rugosa* Nyl., *c. frt.* On hawthorn, Lamlash, and on hazel, Corrie, *West*; on stumps by the shore, Brodick.—*L. chlarona* Nyl. Common on the bark of trees. The f. *minor* Oliv., on mountain ash, Corrie, *West.*—*L. Hageni* Ach., *c. frt.* On the bark of a young sycamore, Lamlash, *West.*—*L. sulphurea* Ach., *c. frt.* On a gritstone boulder, Corriegills shore; probably common.—*L. expallens* Ach., *c. frt.* On larch, Lamlash, *West.* The var. *lutescens* Nyl., near Brodick, and var. *smaragdocarpa* Nyl., Lamlash, *West.*—*L. atra* Ach., *c. frt.* Very common on sandstone rocks, Corriegills; occurs also on quartz-porphyry, Bennan Head, and on basaltic dykes, Kildonan.—*L. badia* Ach. On granite, Goat Fell, *West*; on quartz-porphyry, Drumadoon.—*L. picea* Nyl. On indurated sandstone, Corrie, *West.*—*L. tartarea* Ach. On bark, Corrie, *West.*—*L. parella* Ach., *c. frt.* Very common on maritime rocks, and almost always there associated with *L. atra*; on the bark of an alder, Monamore Glen, *West.* A specimen collected by Mr. West, on bark, at Corrie, may be the f. *porinoides* Crombie (spores 4–9 μ).—*L. pallescens* Nyl., *c. frt.* On ash, Lamlash, *West.*

Rinodina exigua Gray, *c. frt.* On a basaltic dyke on the shore at Kildonan.

Acarospora squamulosa Th. Fr. On indurated sandstone, Tormore.

Pertusaria globulifera Nyl. On mossy bark, Corrie, *West.*—*P. amara* Nyl. Common on bark.—*P. communis* DC., *c. frt.* Very common on bark, and noted on oak, hazel, and mountain ash.—*P. leioplaca* Schaer., *c. frt.* On ash, Monamore Glen; on sycamore, Lamlash; on hazel, Corrie, *West.* The var. *octospora* Nyl. On ash, Corrie, *West.* We have not previously seen this form recorded for Britain.

Gyrophora torrefacta Cromb. Near Brodick, *West.* Recorded for Arran in Crombie's Monograph.—*G. polyphylla* Turn. & Borr. On granite rocks, Goat Fell, alt. 1300 ft., *West.*

Bæomyces rufus DC., *c. frt.* Near Brodick, *West.*

Cladonia pyxidata Fr. Very common.—*C. fimbriata* Fr., var. *tubæformis* Fr., *c. frt.* On decaying wood, near Brodick, *West.*—*C. cervicornis* Schaer. "Arran," Prof. Balfour; on peaty earth, Goat Fell, *West.*—*C. furcata* Hoffm. "Arran," Prof.

Balfour; among mosses on the sandy shore near Brodick Castle. —Vars. *corymbosa* Nyl. and *spinosa* Hook, Corrie, *West.*—*C. Lamarkii* Nyl. (*C. pityrea* var. *Lamarkii* DC.). On ash, near Lamlash, *West.*—*C. squamosa* Hoffm. On peaty earth, Corrie, and near Brodick.—*C. cæspititia* Floerke. On bark, near Lamlash, *West.* — *C. coccifera* Schaer. *c. frt.* Common, on peaty soil, Goat Fell; Corrie; Glen Rosa, &c. — *C. digitata* Hoffm., *c. frt.* "Arran," Prof. Balfour; on peaty ground, Corrie, and between Glen Sannox and Loch Ranza.—*C. macilenta* Hoffm. On mossy tree-trunks and peaty banks, common; the f. *clavata* Fr., on a wall near Brodick, *West.*—*C. bellidiflora* Floerke. "Arran," Prof. Balfour.

Cladina uncialis Nyl. "Arran," Prof. Balfour.

Cœnogonium ebeneum A. L. Sm. On shady, vertical rock-faces of Old Red Sandstone, Corrie, *West.*

Lecidea coarctata Nyl. var. *elacista* Cromb. On sandstone, Brodick.—*L. granulosa* Schaer., *c. frt.* On peaty earth, Goat Fell, and also near Brodick, *West.*—*L. parasema* Ach., *c. frt.* Very common on bark; f. *tabescens* Stitz. and var. *elæochroma* Ach. On ash, Lamlash; var. *limitata* Ach. On sycamore, Corrie and Lamlash, *West.* —*L. latypea* Ach., *c. frt.* On sandstone, near King's Caves. —*L. contigua* Fr., *c. frt.* Common on sandstone rocks, and occurs also on granite.—*L. lactea* Floerke *ex* Schaer. On rock, Brodick, *West.*—*L. rivulosa* Ach., *c. frt.* On indurated sandstone, Corriegills, and also on quartz-porphyry, Drumadoon Point. —*L. nigroclavata* Nyl., *c. frt.* On indurated shale, near Drumadoon Point, associated with *Verrucaria nigrescens* and *V. maculiformis.*

Biatorina lenticularis Koerb., *c. frt.* Sandstone rocks, Corriegills shore. "Must be, I think, *B. lenticularis* Koerb., judging from the very capitate paraphyses. Spores imperfectly developed, but one seen seemed septate, and measured 8 × 2 μ." Miss A. L. Smith, in Rept. Lichen Exchange Club. 1911.—*B. erysiboides* Th. Fr., *c. frt.* On bark, Corrie, *West.*

Bacidia Bechausii Koerb., *c. frt.* On bark, Lamlash, *West.* —*B. incompta* Anzi, *c. frt.* On ash, Monamore Glen and Lamlash, *West.*

Buellia myriocarpa Mudd, *c. fr.* On bark, Corrie, *West.*

Rhizocarpon geographicum DC. Common on granite, and also noted on quartz-porphyry, at Drumadoon Point.—*R. petræum* Mass., *c. frt.* Along with the var. *excentricum* A. L. Sm. On indurated sandstone, near Drumadoon Point. The variety was also gathered on quartz-diorite, on the String Road.

Arthonia gregaria Koerb. var. *astroidea*, Mudd, *c. frt.* On the bark of hazels, Corrie; also along with *Graphis scripta* and *Lecanora subfusca*, in Monamore Glen, *West.* In the latter gathering the f. *cuspidans* A. L. Sm. also occurred.—*A. radiata* Ach., *c. frt.* On sycamore bark, Lamlash, *West.* var. *Swartziana* Sydow. On ash and oak, Lamlash and Monamore Glen, *West.*— *A. punctiformis* Ach., *c. frt.* On alder bark, Monamore Glen; on hawthorn, associated with *Opegrapha herpetica*, *Arthopyrenia epidermidis* and *Lecanora rugosa*, Lamlash, *West.*

Opegrapha herpetica Ach., *c. frt.* On hazel, near Corrie; on sycamore, Lamlash, and on ash, Monamore Glen, *West.*—*O. atra* Pers., *c. frt.* On sycamore, Lamlash, and on hazel, near Corrie, *West* (in the latter gathering the f. *parallela* Leight. and also the var. *arthonoidea* Leight. passing into the ordinary form); var. *denigrata* Schaer., on sycamore, Lamlash.—*O. betulina* Sm., *c. frt.* On sycamores, Lamlash, *West.*—*O. varia* Pers., *c. frt.* On hazels, Corrie, *West.*—*O. vulgata* Ach., *c. frt.* On the bark of sycamores, Lamlash, *West.*

Graphis scripta Ach., *c. frt.* Monamore Glen, and on hazel, Corrie, *West*; var. *serpentina* Nyl., on ash, Monamore Glen, *West.*

Verrucaria maura Wahl., *c. frt.* Common on sandstone rocks at tide-level, Corriegills, and near Drumadoon Point.—*V. nigrescens* Pers., *c. frt.* On a basaltic dyke on the shore, Kildonan, associated with *Lecanora atra*, *L. parella*, *Placodium tegularis*, and *Rinodina exigua*; on quartz-porphyry, Drumadoon Point, and also on indurated shale near the same locality.—*V. maculiformis* Krempelh., *c. frt.* Near Drumadoon Point, associated with the next preceding species. — *V. rupestris* Schrad., *c. frt.* On limestone rocks, in an old quarry at Corrie.

Acrocordia gemmata Koerb., *c. frt.* On hazel, Corrie, and along with *Opegrapha betulina*, on sycamore, Lamlash, *West.*—*A. biformis* Oliv., *c. frt.* On hazel, Corrie, *West.*

Arthopyrenia epidermidis Mudd, *c. frt.* Corrie, and on hawthorn, Lamlash, *West.*—*A. fallax* Arn., *c. frt.* On hazel, Corrie, *West.*

Leptoraphis epidermidis Th Fr., *c. frt.* On hazel, Corrie, *West.*

Pyrenula nitida Ach., *c. frt.* On ash, near Corrie, *West.*

Mycoporellum obscurum A. L. Sm. On hazel, Corrie, *West.*

NEPETA GLECHOMA VAR. PARVIFLORA BENTH.

BY ELEONORA ARMITAGE.

I CAME across a fine patch of this plant on the downs above Merrow, in Surrey, at an elevation of about 350 ft., during the latter part of May this year. Ground Ivy in its typical form is exceedingly abundant on all the extensive down-land hereabouts; many thousands of plants were then in full flower, but only in one spot did I encounter this exceedingly peculiar and conspicuous variety.

Paradoxical as it may seem, this pallid micranthous form, which one might imagine was so unnoticeable as to be passed over altogether, seemed to stand out from the herbage and arrest one's attention. A circle with a diameter of about three yards presented an appearance of soft greyish green mixed with pale lavender on a background of short green herbage. It was this peculiar *facies* which marked it out at once from the dark-leafed, purple-blue type plant which was growing in its close neighbourhood, and of which some specimens were taken at the same time for purposes of comparison, as it was in size and growth the usual down-land form of this somewhat variable plant.

None of the type had invaded this particular area, which was thickly covered with the flowering-stems, mostly as far prostrate as the grassy sward in which it grew allowed, while some were ascending, and from 10–13 cm. high. The usual down-land form was about 10 cm. high. The two plants do not form so striking a contrast in the herbarium owing to the loss of colour in drying.

The leaves of both forms are ovate-reniform and deeply crenate, but there is some difference in the crenations; in the type they are rounded and more cut in at the base, the central one having a rounded apex sometimes terminated by a mucro; in the variety they are more pointed and the central one is acuminate, without a mucro.

With regard to the hairiness of the plant, there is a great difference between the two. The type has a short pubescence on the stem, composed of simple hairs with three or four cells; in the variety the hairs are longer, containing about eight cells, while the nodal tufts have about sixteen cells, and in the type about ten. The typical down-land plant has dark green or purplish green leaves, with a polished surface and short scattered hairs of one to two cells; in the variety the leaves are grey-green, with a dull surface, and are covered with long bristly hairs with six to eight cells, which give the leaves the soft hoary appearance.

With reference to the flowers, the calyx in the type is 5 mm. long, in the variety 4 mm. The corolla of the type is 16 mm. long, with a longly exserted tube, and the colour is purplish blue. The corolla of the variety is only 8 mm. long, and the corolla-tube is included in the calyx; the number of flowers in a whorl is more numerous usually than in the type, and the colour is pale lavender. The variety is apparently a female form, for stamens were absent from all the flowers examined. It is curious that the difference in sex should be accompanied by so many variations from the type in the vegetative characters, and should give the plant a more important varietal standing than the remark in Hooker's *Student's Flora*, "Flowers dimorphic, larger 2-sexual, smaller female." In Babington's *Manual*, ed. 9, it is thus alluded to, "A small subglabrous form with short corolla is var. *parviflora* Benth."; while, as a matter of fact, the variety as I found it is far more hairy than the type.

The flowers were in too young a state to have ripe nutlets; but both in the type and the variety the young nutlets looked exactly alike as far as comparative development went. No doubt the flowers are pollinated by insects from the typical plants close at hand. The plants were vigorous, and gave the appearance of spreading from a centre.

The variety is first mentioned in the *London Catalogue* in the eighth edition, 1886, and is also placed in the ninth edition, 1895; but in the tenth edition, 1908, it is no longer found. What may be the reason of this? It is a very marked plant, surely more so than many described varieties, and was evidently thought to be so by Bentham, who described and named it, and who was usually averse to the splitting up of species.

BIBLIOGRAPHICAL NOTES.

LIII.—John Frederick Miller and his 'Icones.'

A reference to this work—as "J. S. [*sic*] Mill. Fasc. t. 25 (1780)"—in *Index Kewensis* (under *Brucea*) led me to consult it in the more accessible edition published in 1796, under the title *Cimelia Physica*, with descriptions by Dr. George Shaw. For purposes of citation it became necessary to refer to the original edition, and the notes I took when so doing may be worth publishing. The description of the work in Dryander's Catalogue (i. 198) of the Banksian Library runs:—

"(Icones Animalium et Plantarum). Painted, engraved, and published by John Frederick Miller. 1776–1794. Tabb. æneæ color. 60, longit. 18 unc. lat. 12 unc. Nomina et loci natales in pagg. impressis 10."

Banks's copy, of which the above is a description, is, as indicated above, without title-page; it is bound in two volumes, which are lettered on the back "Miller's Plates."

Bound up with and preceding this is a fascicle of seven plates, to which I can find no reference in any published work. The only lettering on each is "Painted, engraved and published by John Miller according to Act, 1780"; they are accompanied by descriptive text, of a character different from that of the *Icones*, as a transcription of the first will show:—

"Tab. I.—Decandria Monogynia.

"*Sophora tetraptera.*

"Is a native of New Zealand.

"Flowered and maturated seeds in the open ground in the Botanic Garden at Chelsea, and in the garden of W. Pitcairn, M.D., at Islington." An. 1779.

"Explanation of the Figures.

"Fig. 1. The flower-bearing Branch.—2. The Vexillum seen on the external side.—3. The same on the interior side.—4 and 5. The Alæ (or Wings).—6 and 7. The dipetalous Carina.—8. The Stamens.—9. The Anthera magnified on both sides.—10. The Style with a Stamen.—11. The Style with the Calyx.—12. The Legumens (or Seed-pots).—13. Two-joints of the Legumen dissected, so that the membranes (A) appear, which include the seeds.—14. The seed."

The other plants figured are:—

Tab. II.—"*Phormium tenax* Forster. . . . ."

Tab. III.—"*Stewartia Malacodendron* Linn. . . . Flowered in the royal gardens at Kew."

Tab. IV.—"*Fothergillia* . . . . Flowered first in the garden of John Fothergill, M.D., at Ham House, in Essex, Anno 1771."

Tab. V. and VI.—"*Heliconia Bihai* Linnæus. . . . Flowered in the royal garden at Kew, An. 1779; and at Bamb. Gascoyne's, Esq., at Barking, in Essex, Anno 1777."

Tab. VII.—"*Lagerstrœmia indica* Linnæus. . . . Flowered in the royal garden at Kew, and at Sir James Cockburn's, Bart.

It is noteworthy that these are dated 1780, and were thus issued (if at all) during the progress of the *Icones*, the dates of which follow.

In the Banksian copy of the *Icones* 36 plates are in one volume, the remainder in the other. Up to 36 all except 35 bear the inscription "published as the Act directs," usually engraved but sometimes added in MS.: the dates run:—

1776—1–12.
1777—13–18, 21.
1778—19, 20, 22–24.
1779—25–28, 30.
1780—29.
1781—31.
1782—32–34, 36.

The plates in the second volume bear no dates, but according to Dryander these extend to 1794. In Dict. Nat. Biogr., following Watt, the date of the volume is given as 1785, but Dryander doubtless had accurate information.

The citation of Miller's name and plate of *Brucea antidysenterica* by L'Héritier (Stirp. Nov. t. x) in 1784 and by Aiton (Hort. Kew. ii. 397) in 1789 shows that the text as well as the figure was accessible to these authors, for the name does not appear on the plate. Lamarck (Mém. Acad., Paris 1784, p. 342) seems to have given the same trivial name independently: he says "On donne le nom de *Brucea* en Angleterre," &c., but goes on to show that no botanist has described it, and adds "Nous le nommerons *Brucea antidysenterica*": this decription he quotes in Encycl. i. 471. Dr. Jackson, as has been seen, dates Miller's plate 1780, but for the specific name he adopts L'Héritier's *ferruginea* (1784), although L'Héritier quotes Miller's earlier name as a synonym.

Miller made the drawings for the plate at the behest of Banks: Bruce (Travels, v., Appendix p. 72) says: "Sir Joseph Banks employed Mr. Miller to make a large drawing from this shrub as it had grown at Kew. The drawing was as elegant as could be wished, and did the original great justice. To this piece of politeness Sir Joseph added another, of calling it after its discoverer's name, *Brucea antidysenterica*." In the Department of Botany are two drawings of the plant by Miller, made at Kew in 1776, where it was raised by seeds sent by Bruce, as we learn from Kew specimens in the Banksian Herbarium.

The name of the genus was no doubt, as Bruce states, suggested by Banks, with whom, as his letters in the Banksian correspondence show, he was in frequent and friendly communication. In the Solander MSS. (and on one of the drawings) it is in Solander's hand, as is also the very full original description.

The synonymy is:—

BRUCEA ANTIDYSENTERICA J. F. Miller, Ic. 25 (1779) and Cimelia Botanica t. 25, p. 51 (1796); L'Hérit. Stirp. Nov. t. x (1784), in syn.; Ait. Hort. Kew. iii. 397 (1789) in syn.;

Lam. in Mém. Acad. Paris, 1784, 342 (1787); Encycl. i. 471 (1784); Banks ex Bruce Trav. v. (Appendix) 72 (1790).

B. ferruginea L'Hérit. Stirp. Nov. t. x. (1874); Ait. Hort. Kew. iii. 397 (1789).

B. abyssinica Spreng. Pugill. ii. 90 (1815).

Not much is known of John Frederick Miller. He was one of the sons of John Miller (Johann Sebastian Müller) and followed his father's profession of artist and engraver. He accompanied Banks and Solander to Iceland (misprinted "Ireland" in Dict. Nat. Biogr.) as artist in 1772; a list of his Iceland drawings will be found in Journ. Bot. 1907, 314. He subsequently drew plants for Banks at Kew and elsewhere; we have in the Department of Botany a number of these, ranging in date from 1772 to 1774: among them are the original sketches for some of the plates in the *Icones—Alstrœmeria Ligta* (t. 2), *Illicium floridanum* (t. 5), *Antholyza æthiopica* (t. 9), and *Brucea* already mentioned. Of many of these, as of some of the Iceland plants, finished drawings were made (also for Banks and now in the Department of Botany) by Thomas Burgis, who was inferior to Miller as an artist. Miller engraved (and drew?) some of the plates for Weston's *Universal Botanist* (vol. iv. 1777). His brother James also drew plants for Banks.

James Britten.

SHORT NOTES.

Maianthemum bifolium in England (p. 202).—In Mr. A. B. Jackson's interesting account of the above species he has not referred (p. 205) to Mr. Braby's (not "Breby") own account of its discovery in Yorkshire in *Science Gossip* for 1876, p. 210. He there gives the history of his finding it, with extracts from letters from Mr. Mitten, Mr. Borrer, and Dr. Walker Arnott. Mr. J. G. Baker (*North Yorkshire*, ed. 2, p. 381 (1892)) remarks, after giving the station: "This is the only British station where the plant is clearly indigenous." Mr. Jackson strangely leaves out its northern distribution. It ranges in Sweden from Scania right up to Lapland; in Finland only misses the most northern provinces, and occurs up to 69° 4′ N. lat.; while in Norway it extends up to 69° 50′ N. lat. Dr. Boswell Syme, who knew the Caen Wood locality well, never supposed it native there, but the authors of the *Flora of Middlesex* suggest "possibly native."—Arthur Bennett.

Elymus arenarius L. in South Devon (p. 226).—In the *Victoria History of the County of Devon* (1906), p. 80, I wrote: "The sea lyme-grass was recorded by Hudson in 1778 as inhabiting the sea-coast near Exmouth; it was also reported from the same station by Jones and Kingston in 1829 on the authority of Miss Filmore, and by Ravenshaw in 1860 on the authority of Mr. Edward Parfitt; but according to a manuscript note in the British Museum herbarium copy of Ravenshaw's *List*, Mr. Parfitt's specimens are *Triticum* (*Agropyrum*) *junceum*; it has been also reported from Paignton and Goodrington sands in the Torquay district. Sir Joseph Hooker, in his *Student's Flora*, does not extend the distribution of the species to Devon, and Mr. Moyle Rogers has closely searched the Exmouth station and Dawlish Warren for this rare grass, and concludes that it is now absent from South Devon; recent observations, however, in other parts justify its retention in the county flora." Also, in the addenda to the same History (p. 130), I wrote, for the Honiton botanical district, which includes Exmouth: "*Elymus arenarius L.* (still found in an old station)." Of my own collecting I have specimens from Exmouth in 1905 and 1906.—W. P. Hiern.

Potamogeton Friesii Rupr. in Caithness.—Mr. G. Lillie has sent me a box of specimens gathered from Achkislock (or Loch Stemster), among which is a small example of the above species; it was growing with *P. perfoliatus* L., *P. alpinus* Balb., and *Utricularia major* Schmid. (*neglecta* Lehm.). It is recorded for the Outer Hebrides! Orkney! and then not till Dumbarton! In Sweden it extends north to Gefleborgs lån, but does not seem to reach Nordland. In Finland it is rare, is recorded by Hjelt (Consp. Fl. Fenn. p. 541, 1895) from Aland and Karelia onegensis, and I have a specimen from Dr. Kihlman from "Shungii," in the same province, and have seen it in the Vienna Herbarium from "Lake Norstrask, 1875, R. Hult and J. Tickham"—this is about 66° 59′ N. lat.; and in Russia to Archangel, ex Herder. I have it also for the Faroes. One of the earliest British specimens I have seen is in the De Candolle herbarium, "Notts, 1833, Jowitt herb."—Arthur Bennett.

Melampyrum pratense L. var. hians Druce. — A few days ago, at the beginning of July, I found this well-marked variety, with its golden-yellow flowers and open corolla, growing in the Downton Gorge, near Wigmore, North Herefordshire. It is alluded to in the *Herefordshire Flora* as a yellow variety of the common Cow-wheat, but, as far as I know, it has not been published as a Herefordshire plant under its own name. I have also found it growing at Aira Force, in Cumberland. The picturesque wild rocky gorge formed by the river Teme at Downton, cutting through the Silurian rocks, is well wooded with fine specimens of oak, ash, wych elm, and large trees of *Tilia platyphyllos*, which, I have no doubt, is native here as well as in South Herefordshire, in the Wye Gorge.—Eleonora Armitage.

Damasonium Alisma Mill.— The following interesting note occurs in a paper by Mr. Bennett on aquatic plants, mainly concerned with Scottish plants, which is reprinted in Trans. Bot. Soc. Edinb. xxvi. 27 (1913), from the *Scottish Botanical Review*, 1912, p. 23. Mr. Bennett watched *Damasonium* in a pond on Mitcham Common through the summer of 1887. "In April it was the form *graminifolium* Glück; in May it began to make itself into the form *spathulatum* Glück; at the end of June it had become the form *natans* Glück; flowered through July and part of August;

at the end of August the water became very low, and the plant here and there became stranded; it was now the form *terrestre* Glück. The only one I could not say I saw was the form *pumila* Glück, which he describes as 'misera forma terrestris semine nata,' &c. The figure in *English Botany* (t. 1615, 3rd ed. t. 1442) shows a state between Glück's *natans* and *terrestris*. In the description no mention is made of any other leaves than the cordate floating ones. The plants noted were simply the growth and evolution of the species, influenced by warmth and depth of water. Certainly in July and August, when gathering this in other parts of Surrey, only the form *natans* could be seen on the water surface; but, carefully working in the mud, the form *graminifolius* was found, probably the result of last year's seeding. Syme in *English Botany* queries it as a perennial; Hooker and Babington are silent on this point; Bentham calls it an annual; Grenier and Godron call it perennial, and Ascherson and Graebner also. My own opinion is that it is neither, but a biennial, as I never was able to find any stolons as in *Hydrocharis* or *Alisma*; and the seeds evidently drop off, sink (they sink at once when ripe!), and in winter or early spring form the little tufts found in July with grass-like leaves."

Lamium hybridum Vill.—During 1912 plants of this species were met with in Surrey and in Essex with unusually conspicuous flowers, which almost invited comparison with the long corollas of *L. amplexicaule*. The existence of this larger-flowered form seems to support the view held by some botanists that *L. hybridum* is a fixed hybrid derived from *L. purpureum* and *L. amplexicaule*. I find that these larger-flowered plants agree well with the form described by Rouy (Fl. de France, xi. p. 296) as var. *dissectum* Mutel, "Plante plus robuste; tube de la corolle nettement et ± long. exsert; feuilles sup. plus cunéiformes à la base, obtuses, à dentelure plus profonde," except that some of my Surrey plants, growing on a dry sandy bank, could hardly be described as "robuste." This larger-flowered form also agrees with Mutel's own description and figures in his *Flore française*, iii. 261, f. 364.—C. E. Britton.

Armoracia rusticana with dissected leaves.—In his note on this subject (Journ. Bot. 1912, 95) Dr. Rendle suggested that perhaps the very dry summer of 1911 had had some effect in the production of this abnormality. At Par, East Cornwall, where, in 1911, I noticed only one plant with dissected leaves, in August, 1912—a remarkably wet season—I noticed many. Entire and dissected leaves grew together, but on separate "crowns," that is to say, each crown produced only one kind of leaf.—Chambré C. Vigurs.

Plantago media L.—Last year I gathered in the vicinity of Epsom Downs, Surrey, a remarkable-looking example with narrow, more or less erect leaves, instead of the usual broad leaves appressed to the soil. To some botanists the plant would, I do not doubt, suggest the combination *P. lanceolata* × *media*, but I do not think *P. lanceolata* enters into it. My plant agrees admirably with the description of *P. media* var. *Monnieri* Rouy in the *Flore de France*, x. p. 133, "Feuilles sublancéolées, long^{t} petiolées; épi cylindracé," but, in the absence of examples of this variety in the National Herbarium, I am unable to say whether my plant is identical with it.—C. E. BRITTON.

VIOLA CALCAREA Gregory.—Mr. Arthur Bennett (p. 22) says *V. parvula* Opiz (reduced to a variety of *hirta* by Kosteletzky) is no doubt the above plant. May I ask if he has seen authentic specimens? With plants so highly critical as the violets it is somewhat dangerous to decide by descriptions alone. We have seen that Babington's variety *calcarea* included also *V. Foudrasi*. —G. CLARIDGE DRUCE.

REVIEWS.

SOME BOOKS ON GARDENING.

SEVERAL books on gardening have lately reached us, concerning which a few words are due. One of the cheapest and most comprehensive volumes we have seen is that by Mr. John Weathers, entitled *Twentieth Century Gardening* (Simpkin, 1*s*.). This is an attractively bound and well printed volume of more than 300 pages with nearly a hundred cuts, and contains practical instructions for every kind of flower-garden, with full lists and brief descriptions of the plants most suitable for each; fruit-trees and the vegetable garden are fully dealt with, and there is an excellent calendar of garden work for each month as well as a capital—and we are glad to note, only one—index. Mr. Weathers's name is guarantee for the quality of the letterpress; the book should be a boon to all garden lovers, especially to those who have little to spend on books. The same publishers have also reissued at a cheap rate (1*s*. 6*d*. each) Mr. Weathers's attractive books dealing respectively with *Garden Flowers*, *Bulbous Plants*, *Flowering Trees and Shrubs*, and *Roses*. Each volume contains 33 well executed coloured plates—many containing more than one species—and 150 pages of suitable letterpress.

Garden Work, by Mr. William Good (Blackie, 5*s*. net.) is a handsome small quarto volume which gives, as its title implies, a complete summary of the subject in so far as that relates to actual work in the garden. It is intended, the author tells us, not only for those who take up gardening for pleasure, but also for those who are making a special study of it, or who may be preparing for examinations; for this latter purpose it will be found very serviceable—the chapter on "The Plant," for example, gives a good summary of plant physiology. There are good coloured plates and other illustrations.

Messrs. Crosby, Lockwood & Son send us a volume on the *Propagation and Pruning of Hardy Trees, Shrubs*, &c. (6*s*. net.), which is mainly of a practical nature. The numerous (56) figures are useful rather than attractive; the descriptive lists are a little puzzling in arrangment, as, although the name of one species only appears as a heading, the descriptive portion deals with the genus: "Heaths, *Erica cinerea*" is followed by an account of the cultivation of heaths in general, which can have little to do with *E. cinerea*. The appearance of the book is not attractive, but that need not detract from its usefulness.

School Gardening, "with a guide to horticulture" (3*s*. 6*d*.), is a recent addition to the University Tutorial Series published by Mr. B. Clive. It is a compact, solid, and comprehensive volume, almost severely practical and, as the title of the series denotes, intended for the teacher rather than for the youthful gardener, who however will profit through the medium of the former by the ample information conveyed. The book is fully illustrated and crammed with information.

Wild Flower Preservation: a Collector's Guide. By MARY COLEY. With 29 illustrations by HILDA M. COLEY. 8vo, fancy cloth. Pp. 191. Price 3*s*. 6*d*. net. T. Fisher Unwin.

THIS volume "has been written mainly for the amateur botanist. It has not been written for the professional botanist or for the lordly being who knows quite well that plants cannot be pressed successfully; so if you are that type of soured or learned person, let me implore you to put the book down at once!" (p. 18). On botanists, indeed, Miss Coley is, we think, unduly severe: "Many in the past had more learning than patience or common sense, and their collections have so discouraged the younger generation of naturalists that many of them have given up pressing any but their rough 'finds'" (p. 20). Miss Coley's experience seems to have been unfortunate, and, we will add, peculiar: "A few years ago an enthusiastic botanist asked me to look over his collection of rare species. A mighty portfolio was dragged from its place, large mounts were tenderly handled, and the learned one proceeded to declaim (!) upon the rarity of the specimens, their wonderful construction, and their exceeding beauty." Miss Coley "cudgelled [her] brains for suitable yet truthful answers to the poor man's raptures": she "was gazing at a scarecrow, ugly enough to strike terror into the breast of the most impudent of little sparrows, while a story of the plant's extraordinary beauty was being poured into [her] ears." "The situation had its difficulties," which could hardly have been diminished when "a boy-friend muttered '*What* a freak!' in that sepulchral undertone so beloved of schoolboys" (pp. 112, 113). The author is not ignorant that "a botanist ought to be a fascinating companion and one of the most entertaining of guests at picnic and rambling parties," "but he sometimes"—indeed, frequently, for most of us have met such a person—"positively hurls knowledge at the heads of *les autres*, and pours forth torrents of Latin at the least provocation" (pp. 80, 81). The accuracy of this description will be at once apparent to our readers, especially when supplemented by the information that "some botanists mount their plants in albums" (p. 35).

Apart from the unfortunate "gush" which prevails throughout, the book contains useful suggestions as to collecting and drying plants, "still keeping one principal object in view—to preserve their symmetrical shape." But the suggestions are over-elaborate; thus a chapter is devoted to "A Nature Notebook," which is "the most important item in the botanical outfit—more important than your herbarium, and, in a sense, even more important than your Flora" (p. 46). How many of our readers, we wonder, keep "a Nature Note-book," and how many of Miss Coley's will attain so comprehensive an ideal as that which she describes? By the way, if they copy references to flowers into the book, as she suggests, it will be well to assign them correctly. Browning's "dark depth on depth of lustre hid in the harebell" relates to the wild hyacinth, which shares the name with *Campanula rotundifolia.*

The book includes some useful hints as to popular works which may help the beginner—we regret that the inferior edition of *Flowers of the Field* (whose author was "Johns," not "John") should be recommended instead of that published by the S.P.C.K.—and an illustrated glossary of botanical terms; it may thus be regarded as a popular introduction to botanical study, and may prove of service to the beginner. But those who need instruction in collecting will find their wants supplied more efficiently, and more cheaply, in the *Instructions for Collectors*, No. 10, which may be obtained for 3½*d.*, post free, from the Department of Botany, British Museum (Nat. Hist.). Cromwell Road, S.W.

BOOK-NOTES, NEWS, &c.

A COMPREHENSIVE account of the "Mosaic Disease of the Tomato and related Plants" appears in the June number of the *Ohio Naturalist* (vol. xiii. pp. 149–173 (1913)), where Leo E. Melchers has gathered together all the facts relating to this mysterious disease. It was originally described from the leaves of tobacco-plants, but it has also been found on numerous other hosts—petunias, violets, beans, cucumbers, &c. It is, however, more particularly a disease of Solanaceous plants; it seems to be present throughout the tobacco-growing regions of the world; it is not uncommon on tomatoes grown under glass, and has also appeared on greenhouse potatoes. The first symptoms of the disease are the mottled, faded spots that cover the leaf, which indicate a serious loss of vitality in the plants attacked. Though many workers have made a study of the disease, the origin of it is not yet definitely ascertained. The most likely theory is that of bacterial action, but bacteria have not yet been conclusively demonstrated. Other causes have been suggested, such as the "Virus" theory or some physiological disturbance. The virus is supposed to be some soluble substance that has a deleterious action on the plant-cell. With regard to the "physiological" theory, various causes are assigned as originating the disturbance; artificial injuries, soil-conditions, &c.—"some abnormal conditions resulting in a localized over-production of enzymes." Melchers, from his own study and observation of mosaic disease, favours the view that it is due to enzymes, and is often induced by over-forcing.—A. L. S.

At the meeting of the Linnean Society on June 19 Mr. Edmund G. Baker gave an abstract of his paper on the African species of *Crotalaria*, 309 in number, illustrating the sections by lantern-slides. "A Revision of the Genus *Symphytum*," by Mr. Cedric Bucknall, was laid before the Society in abstract. It gives a sketch of the history and geographical distribution of the genus, followed by an account of the characters of the species, of former systems of classification, together with the classification now proposed, an analytical key and detailed descriptions of the species. Two new species are described. Dr. C. E. Moss referred to the recent discoveries in Britain of varieties of certain plants, instancing three varieties of *Populus nigra* and as many of *Alnus glutinosa*, *Ranunculus ficariæformis*, *Primula scotica*, var., *Lycium barbarum* confused with *L. chinense*, both of which occur, and *Gymnadenia Wahlenbergii* and *G. densiflora*, both figured by Reichenbach.

We have received the prospectus and specimen plates and pages of what will evidently be a sumptuous work on *British Flowering Plants*. It will form three volumes in royal quarto, bound in buckram, and will be printed on specially prepared paper: the illustrations are from drawings in water-colour by Mrs. Henry Perrin, and the text is supplied by Professor Boulger: the price for the complete work will be twelve guineas and only a thousand copies will be printed. Judging from the specimens sent us, the plates are quite good, though the arrangement of the *Euonymus* is not pleasing, and we do not know why the root of *Vicia Cracca* is given, as it does not show the tubercles referred to in the text and is not in itself attractive: there are no dissections. The text is of course accurate, and fuller than is usual in books of the kind. We confess, however, that we do not see a public for the work, which is not sufficiently complete for the botanist—only about 285 species will be figured and grasses, sedges and the like are excluded—or even for the advanced amateur, while the price is prohibitive for all but the wealthy, for whose drawing-room tables it will form an attractive ornament.

The recent part (vol. xxvi. pt. 1) of the *Transactions and Proceedings of the Botanical Society of Edinburgh* consists mainly of papers that had already appeared in the short-lived *Scottish Botanical Review*, which was described on its title-page as "including the Transactions of the Botanical Society of Edinburgh." The desirability of uniformity renders such a reissue intelligible; but from a bibliographical point of view it is surprising and indeed regrettable that no indication is anywhere given that the papers have already appeared. Among these contents are new plants indicated as "new species," which of course really date from 1912. The part includes a number of useful "short notes" which seem hardly in place in the "Transactions" of the Society. In the interest of bibliographers as well as of botanists we would venture to suggest that a note explanatory of the circumstances indicated above should be prefixed to the volume when it is completed.

A SECOND edition of Mr. Druce's *Flora of Oxfordshire* is announced for publication by the Clarendon Press. The book has been entirely re-written, and it is intended to make it not only a catalogue of the county species, with their localities, but also a history of them, and of the botanists connected with the University and county. Mr. Druce also announces as in preparation *The Flora of Buckinghamshire.* This will be on the same lines as the Floras of Oxfordshire and Berkshire, to which it will be a companion volume, and with them will complete the Flora of the Upper Thames province.

THE sixth volume of the Oxford translation of Aristotle published by the Clarendon Press, which Mr. W. D. Ross is editing, has been completed by the part containing *De Plantis*, which has been undertaken by Mr. E. S. Forster. The price of the part is 5*s*. net.

THE *Journal of Genetics* for June (vol. iii. n. 1) contains a "Preliminary Note on Heterostylism in *Oxalis* and *Lythrum*," by N. Barlow, who deals with the heredity of the three forms in trimorphic heterostyled plants. The results of the work of Darwin and Hildebrand are stated to be of "no great help to us at present," except with regard to the "self-fertilized *Lythrum*" of Darwin. The present investigations are mainly based upon *Oxalis valdiviana*. M. Philippe de Vilmorin writes "Sur une race de blé nain inflexible."

MR. W. R. MAXON'S *Studies of Tropical American Ferns* No. 4 (Contrib. U. S. Nat. Herb. xvii. Washington: 1913. Pp. 133–179. 10 plates and figs.) is a careful and thorough piece of work which clears away much misunderstanding that attached to the following groups:—*Asplenium Trichomanes* and its American allies (nineteen species); the North American tree-ferns of the genus *Dicksonia* (four species); the genus *Odontosoria* in a revised and restricted sense (ten species); *Bommeria* and some related genera. In these and in some notes on *Lycopodium* and *Cyathea* he describes a total of sixteen new species. The keys, the citations of literature and exsiccatæ, the distribution, critical notes, and the painstaking treatment throughout, show Mr. Maxon's work to be of the highest order. He appeals to pteridologists to revise such genera as *Adiantum*, *Pteris*, *Blechnum*, certain groups of *Asplenium* and *Athyrium*, *Lindsaya*, *Polystichum* and others; and to model their work upon Christensen's conscientious and elaborate new monograph of *Dryopteris*.

PLANTS OF THE SUDAN COLLECTED BY DR. D. T. MACDOUGAL.

By A. B. Rendle, D.Sc., F.R.S.

Dr. MacDougal's work on desert vegetation, and as Director of the Desert Laboratory at Tucson, Arizona, is well known. He has recently made a trip to the dry regions of the Sudan and the Egyptian Desert, the results of which will shortly be published. The plants collected on the expedition by Mr. Sykes and himself have been determined by members of the Staff of the Department of Botany of the British Museum, and will in due course be deposited in the National Herbarium. As a certain proportion of the species have not been recorded for the area in question, it has been thought worth while to publish a systematic list. The collection contained one new species, a Composite, which Mr. Spencer Moore has described as *Geigeria Macdougalii*.

According to information furnished by Dr. MacDougal the expedition was undertaken for the purpose of studying the physical and biological conditions of the eastern and western slopes of the mountain range between the Nile and the Red Sea, and of an expanse of the Libyan desert.

The party landed at Port Sudan, Jan. 20th, 1912, and after a few excursions across the lower slopes and into the foothills as far as Sal Lom, a saloon car was chartered from the Sudan Government Railway, in which they travelled across the mountains to Atbara and Khartoum. The principal collection on the eastern side of the range was made at Kamobsana, where the bed and margin of Khor Adit and a mountain to the eastward of the railway station rising to a height of 2700 ft. were examined. The crests of the range attain a height of over 5000 ft. in this region, but the railway route passes through at much lower elevations at Sinkat, Erheib, and Gebeit.

Some time was spent at Talgwareb on Khor el Ushari, on the long gentle western slopes leading down toward the Nile, at which place the conditions are much more arid than on the eastward exposures. Nearly one hundred and seventy species were noted in the ten days' work in this region.

From Khartoum the party came down the Nile by rail and steamer to Luxor, where the train was taken to the oasis of Kharga. Here a caravan was organized, and, starting on Feb. 11th, a journey of nearly six hundred miles was taken into the Libyan desert. The old caravan track was followed from Nadura in the oasis of Kharga to Tenida, in the oasis of Dahkla, and then to Smint, Mut, Rashida, and Qasr Dakhl. The ascent of the escarpment was made from the last-named place, and the sand-lanes through the great dunes were followed in a direction slightly west of north to the oasis of Farafra. The route now ran to the north-eastward to the oasis of Baharia, which, like all of the oases, lies at the bottom of a great depression. Ascending the escarpment on the eastern border of the basin late in February the traverse to the Nile was made in less than a week, and Minia was reached on March 3rd. But little attention was paid to the vegetation of the irrigated areas in the oases, and only species supposedly native to the region were noted. Of these but twenty-six numbers were collected in making the entire loop out into the desert, a journey of over six hundred miles. The sparsity of the vegetation may be indicated by the fact that in one place the caravan travelled thirteen hours, or over thirty miles, without meeting a single seed-plant alive or dead.

The polypetalous Dicotyledons have been determined mainly by Mr. A. J. Wilmott, the gamopetalous and apetalous Dicotyledons by Mr. H. F. Wernham and Mr. S. Moore, and the Cryptogams by Mr. A. Gepp.

DICOTYLEDONS.

CRUCIFERÆ.

Farsetia ægyptia Turra var. *ovalis* Boiss. Near caravan track, Farafra to Baharia, Feb. 23rd.—*F. longisiliqua* Decne. Sal Lom, Red Sea Province, Jan. 23rd.

Matthiola elliptica R. Br. Sandy slopes near Kamobsana, Red Sea Province, Jan. 25th.

Sisymbrium Irio L. Sandy soil of khor and mountain slopes, Kamobsana, Red Sea Province, Jan. 25th.

CAPPARIDACEÆ.

Cadaba farinosa Forsk. A tree much ravaged by grazing animals, 12 to 20 ft. high. Sandy soil in khors, near Sal Lom, Red Sea Province, Jan. 23rd. — *C. longifolia* DC. A shrub. Low ground near shore. Port Sudan, Red Sea Province, Jan. 21st.

Capparis decidua Edgew. A tree. Near Port Sudan, Red Sea Province, Jan. 22nd.

Cleome papillosa Steud. Rocky hill near Sal Lom, Red Sea Province, Jan. 23rd.—*C. paradoxa* Br. Slope of hill near Sal Lom, Red Sea Province, Jan. 23rd.

Mærua crassifolia Forsk. A tree along khor; Talgwareb, Red Sea Province, Jan. 26th.

RESEDACEÆ.

Oligomeris subulata Boiss. Climbing on *Acacia*, Port Sudan, Red Sea Province, Jan. 22nd.

FRANKENIACEÆ.

Frankenia pulverulenta L. Tenida, Oasis of Dakhla, Feb. 14th.

CARYOPHYLLACEÆ.

Cometes abyssinica R. Br. Sal Lom hill, Red Sea Province, Jan. 23rd.

Polycarpæa prostrata Decne. Sandy soil in khor, Kamobsana, Red Sea Province, Jan. 25th.—*P. staticeformis* Hochst. Flats near Port Sudan and hill slopes near Kamobsana, Red Sea Province, Jan. 21st and 25th.

Spergula flaccida Aschers. Slopes near Kamobsana, Red Sea Province, Jan. 25th.

Spergularia marginata Bor. Along irrigating channels. Mut, Oasis of Dakhla, Feb. 16th.

TAMARISCINEÆ.

Tamarix mannifera Ehrenb. Among sand-dunes, Oasis of Kharga, Feb. 11th.

MALVACEÆ.

Abutilon denticulatum Webb. Slopes near Kamobsana, Red Sea Province, Jan. 25th.—*A. muticum* Webb. Sandy soil of khors, near Port Sudan, Red Sea Province, Jan. 22nd.

Hibiscus micranthus L. fil. A small shrub. Sal Lom, Red Sea Province, Jan. 23rd.

Pavonia triloba Hochst. Slopes near Kamobsana, at 2700 ft., Red Sea Province, Jan. 25th.

ZYGOPHYLLACEÆ.

Fagonia Bruguieri DC. Near Gebeit, Red Sea Province, Jan. 26th.

Tribulus bimucronatus Viv. At 2500 ft., Kamobsana, Red Sea Province, Jan. 25th.

Zygophyllum coccineum L. Tenida, Oasis of Dakhla, Feb. 15th. —*Z. simplex* L. Forming mats 6 to 16 in. across. Near Port Sudan, Red Sea Province, Jan. 20th.

VITACEÆ.

Cissus quadrangularis L. A vine, trailing and climbing over bushes in khors, Kamobsana, Red Sea Province, Jan. 25th.

LEGUMINOSÆ.

Acacia albida Delile. A tree, 10 to 20 ft. high; slopes, 2500 ft., Kamobsana, Red Sea Province, Jan. 25th. — *A. pterygocarpa* Hochst. ex Benth. Low ground near Port Sudan, Red Sea Province, Jan. 21st.

Alhagi maurorum Medic. Tenida, Oasis of Dakhla, Feb. 15th.

Astragalus eremophilus Boiss.? Khor near Port Sudan, Red Sea Province, Jan. 22nd.

Clitoria Ternatea L. Flats, Port Sudan, Red Sea Province, Jan. 21st.

Crotalaria microphylla Vahl. Port Sudan, Red Sea Province, Jan. 22nd.—*C. senegalensis* Bacle. Port Sudan, Red Sea Province, Jan. 21st.

Indigofera anabaptista Steud. Slopes, 2300 ft., Kamobsana, Red Sea Province, Jan. 25th.—*I. argentea* L. Hill slopes, Sal Lom, Red Sea Province, Jan. 23rd.—*I. spinosa* Forsk. Shrubby. Near Kamobsana, Red Sea Province, Jan. 25th.

Lotononis Leobordea Benth. Slopes, 2500 ft. Near Kamobsana, Red Sea Province, Jan. 25th.

Lotus arabicus L. Flats, Port Sudan, Red Sea Province, Jan. 21st.—*L. glinoides* Delile. Slopes near Kamobsana, Red Sea Province, Jan. 25th.

Sesbania ægyptiaca Pers. Tree; near wells. Mut, Oasis of Dakhla, Feb. 16th.

CRASSULACEÆ.

Umbilicus horizontalis L. Moist shaded places on slopes, 2600 ft., Kamobsana, Red Sea Province, Jan. 25th.

CUCURBITACEÆ.

Citrullus Colocynthis Schrad. Slopes near Port Sudan, Red Sea Province, Jan. 22nd.

Coccinia moghadd Aschers. Climber; near bed of khor, Kamobsana, Red Sea Province, Jan. 25th.

Corallocarpus Fenzlii Hook. fil. A vine. Port Sudan, Red Sea Province, Jan. 22nd; and hill slopes, Sal Lom, Red Sea Province, Jan. 23rd.

Cucumis prophetarum L. Port Sudan, and mountain slopes, 2600 ft., near Kamobsana, Red Sea Province, Jan. 22nd and 25th.

FICOIDACEÆ.

Aizoon canariense L. Flats near Port Sudan, Red Sea Province, Jan. 21st.

Gisekia pharnacioides L. Port Sudan, Red Sea Province, Jan. 22nd.

Orygia decumbens Forsk. Sal Lom, Red Sea Province, Jan. 23rd.

Trianthema pentandra L. Khor near Port Sudan, Red Sea Province, Jan. 22nd.

UMBELLIFERÆ.

Pimpinella etbaica Schweinf. Slopes, Kamobsana, Red Sea Province, Jan. 25th.

COMPOSITÆ.

Achyrocline luzuloides Vatke. Slopes, 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

Bidens pilosa L. Slopes, 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

Francœuria crispa Cass. Sandy bed of khor, Talgwareb, Red Sea Province, Jan. 26th; and low grounds near Nadura, Oasis of Kharga, Feb. 11th.

Geigeria Macdougalii S. Moore, sp. n. Annua, humilis, *radice* filiformi simplici; *caule* abbreviato simplici vel rare ramoso dense folioso glabro; *foliis* sessilibus oblanceolatis vel lanceolato-oblongis apice mucronatis basin versus angustatis membranaceis margine ciliolato exempto fere glabris glandulis immersis copiose indutis; *capitulis* pro rata parvis terminalibus vel in axillis approximatis solitariis foliis imminutis sæpe stipatis circiter 12-flosculosis anguste campanulatis; *involucri* puberuli circa 4-serialis phyllis oblongis exterioribus spinuloso-acuminatis intimis tantummodo acuminatis his erectis illis superne patentibus vel etiam paullulum reflexis omnibus tenuiter crustaceis; *achæniis* adhuc crudis turbinatis villosis; *pappi squamis* 10 ovatis 5 exterioribus apice rotundatis vel rotundato-truncatis 5 interioribus arista quam sese breviori onustis.

Hab. Hill slopes at Sal Lom, Red Sea Province, Jan. 23.

Plant rising at most to 2–3 cm. above the soil. *Lower internodes* up to 3 mm. in length, upper 2 mm. or less. *Leaves* 2–3 cm. long, near the middle 6–10 mm. broad, green in the dry state; reduced leaves beneath the capitula ± 5 mm. long and about 1 mm. broad. Capitula 6·5 × 3·5 mm. Outermost leaves of the involucre often foliaceous near the top, up to 6·5 mm. long and 1·5 mm. in breadth; inner leaves about 5 mm. long. Receptacular paleæ linear-acuminate divided to the middle or beyond. Corolla of ray-florets 4·5 mm. long, of disk florets 3 mm. Immature achenes 1–1·25 mm. long. Scales of the pappus 1 mm. long, awn of the inner ones ·5 mm. long or slightly more.

Near *G. acaulis* Oliv. & Hiern, but entirely different in foliage and indumentum.—[S. M.]

Hochstetteria Schimperi DC. Sandy soil of khor, Kamobsana, Red Sea Province, Jan. 25th.

Launea nudicaulis Hook. fil. Near Port Sudan, Red Sea Province, Jan. 21st.

Lomatolepis glomerata Cass. Khor near Port Sudan, Red Sea Province, Jan. 22nd.

Picridium tingitanum Desf. Rocky slopes near Kamobsana, Red Sea Province, Jan. 25th.

Tripteris Vaillantii Decne. Near Kamobsana, Red Sea Province, Jan. 25th.

Vernonia cinerascens Sch. Bip. Slopes, 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

Zollikoferia chondrilloides Desf. Fields, Mut, Oasis of Dakhla, Feb. 16th.

CAMPANULACEÆ.

Heterachæna massauensis Fresen. Kamobsana, Red Sea Province, Jan. 25th.

PLUMBAGINACEÆ.

Statice axillaris Forsk. Woody small khors, Port Sudan, Red Sea Province, Jan. 21st.

PRIMULACEÆ.

Anagallis arvensis L. Slopes, 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

SALVADORACEÆ.

Salvadora persica L. A small tree. Slopes, 2700 ft., near Kamobsana, Red Sea Province, Jan. 25th.

ASCLEPIADACEÆ.

Asclepias flavida N. E. Br. Slopes, 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

Calotropis procera R. Br. Along wash, near Kamobsana, Red Sea Province, Jan. 25th.

Duvalia sulcata N. E. Br. Succulent, 8 in. high; short stems forming adventitious roots; flower on the ground. Slopes, 1500 ft., Kamobsana, Red Sea Province, Jan. 25th.

Leptadenia sparteum Wight. Along khors, Port Sudan, and Kamobsana, Red Sea Province, Jan. 22nd and 25th.

Podostelma Schimperi K. Schum. Sandy bed of khor, Kamobsana, Red Sea Province, Jan. 25th.

GENTIANACEÆ.

Enicostema littorale Blume. Near Port Sudan, Red Sea Province, Jan. 21st.

BORAGINACEÆ.

Heliotropium dubium R. Br. Port Sudan, Red Sea Province, Jan. 22nd.—*H. longiflorum* Hochst. Hill slopes, Sal Lom, Red Sea Province, Jan. 23rd.—*H. pallens* Del. Near Port Sudan, Red Sea Province, Jan. 24th.—*H. strigosum* Willd. Sandy soil in khors, Sal Lom, and slopes at 2300 ft., Kamobsana, Red Sea Province, Jan. 22nd and 25th.

Trichodesma Ehrenbergii Schweinf. Slopes, Kamobsana, Red Sea Province, Jan. 25th.

CONVOLVULACEÆ.

Convolvulus glomeratus Choisy. Prostrate, spreading. Port Sudan; khor near Port Sudan; and hill slopes, San Lom, Red Sea Province, Jan. 21st–23rd.

Cressa cretica L. Flats, Port Sudan, Red Sea Province, Jan. 21st, and fields, Mut, Oasis of Dakhla, Feb. 16th.

Cuscuta planiflora Ten. Port Sudan, Red Sea Province, Jan. 21st.

Merremia pedata Hallier f. A trailing vine. Port Sudan, Red Sea Province, Jan. 22nd.

SOLANACEÆ.

Lycium persicum Miers. A shrub. Sal Lom, Red Sea Province, Jan. 23rd.

Solanum dubium Fres. Port Sudan, Red Sea Province, Jan. 21st.—*S. hirtulum* Steud. Sandy soil of khor, Kamobsana, Red Sea Province, Jan. 25th.—*S. unguiculatum* Rich. 2600 ft., near Kamobsana, and near Erheib, Red Sea Province, Jan. 25th and 26th.

Withania somnifera Mor. Near railway station, Kamobsana, Red Sea Province, Jan. 25th.

SCROPHULARIACEÆ.

Anticharis arabica Endl. Hill slopes, Sal Lom, Red Sea Province, Jan. 23rd.

Linaria hastata R. Br. Flats near Port Sudan, Red Sea Province, Jan. 21st.—*L. macilenta* Decne. Slopes near Kamobsana, Red Sea Province, Jan. 25th.

Lindenbergia sinaica Benth. Slopes, 2700 ft., near Kamobsana, Red Sea Province, Jan. 25th.

Schweinfurthia aptera Vatke. Port Sudan and sandy flats, Kamobsana, Red Sea Province, Jan. 22nd and 25th.

Scrophularia arguta Soland. 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

OROBANCHACEÆ.

Cistanche lutea Hoffm. & Link. Parasitic. Kamobsana, Red Sea Province, Jan. 25th.

PEDALIACEÆ.

Rogeria adenophylla J. Gay. Sandy soil of khor, Sal Lom, Red Sea Province, Jan. 23rd.

ACANTHACEÆ.

Barleria triacantha Hochst. Sal Lom, Red Sea Province, Jan. 23rd.

Blepharis edulis Pers. Sal Lom, Red Sea Province, Jan. 23rd.

Ecbolium anisacanthus C. B. Clarke. Shrubby. Mountain slopes, 2700ft., near Kamobsana, Red Sea Province, Jan. 25th.

Ruellia patula Jacq. Slopes, 2700 ft., near Kamobsana, Red Sea Province, Jan. 25th.

VERBENACEÆ.

Priva leptostachya Juss. Kamobsana, Red Sea Province, Jan. 25th.

LABIATÆ.

Lavandula coronopifolia Poir. Small shrub. Slopes, 2700 ft., Kamobsana, Red Sea Province, Jan. 25th.

Leucas inflata Benth. Shrubby. Sandy soil of khor, Sal Lom and Kamobsana, Red Sea Province, Jan. 23rd and 25th.—*L. urticifolia* Br. Sandy soil of khor, Kamobsana, Red Sea Province, Jan. 25th.

Orthosiphon somalense Vatke. Slopes near Kamobsana, Red Sea Province, Jan. 25th.

PLANTAGINACEÆ.

Plantago ciliata Desf. Slopes near Kamobsana, Red Sea Province, Jan. 25th.

NYCTAGINACEÆ.

Boerhaavia verticillata Poir. Port Sudan, Red Sea Province, Jan. 22nd.

AMARANTACEÆ.

Ærua tomentosa Forsk. Bed of khor near Port Sudan; hill slopes, Sal Lom; mountain slopes, 2600 ft., near Kamobsana; and sandy flats, Kamobsana, Red Sea Province, Jan. 22nd–25th.

Amaranthus Blitum L. Port Sudan, and sandy soil of khor, Kamobsana, Red Sea Province, Jan. 22nd and 25th.

Psilotrichum cordatum Moq. Near Kamobsana, 1500 ft., Red Sea Province, Jan. 25th.

Pupalia lappacea Juss. Slopes near Kamobsana, Red Sea Province, Jan. 25th.

CHENOPODIACEÆ.

Caroxylon fœtidum Moq. In low places near Tenida, Oasis of Dakhla, Feb. 14th.

Chenopodium murale L. Near Kamobsana, Red Sea Province, Jan. 25th.

Haloxylon Schweinfurthii Aschers. Summit of escarpment, north of Qasr Dakhl, Oasis of Dakhla, 1500 ft.

Suæda vermiculata Forsk. Near Port Sudan, Red Sea Province, Jan. 20th.

Traganum nudatum Delile. Lower part of defile, north of Qasr Dakhl, Oasis of Dakhla, Feb. 18th.

POLYGONACEÆ.

Calligonum comosum L'Hérit. Near "El Wad," caravan track, Farafra to Baharia, Feb. 24th.

Rumex vesicarius L. Hill slopes, Red Sea Province, Jan. 23rd.

EUPHORBIACEÆ.

Chrozophora plicata Juss. Tenida, Oasis of Dakhla, Feb. 15th.

Euphorbia arabica Hochst. & Steud. Kamobsana, Red Sea Province, Jan. 25th. — *E. cuneata* Vahl. A small spreading tree, with greenish bark. On rocky slopes, Sal Lom, and Kamobsana, Red Sea Province, Jan. 23rd and 25th.—*E. granulata* Forsk. Sal Lom, Red Sea Province, Jan. 23rd.—*E. infausta* N. E. Br. Near Gebeit, Red Sea Province, Jan. 25th.—*E. scordifolia* Jacq. Shallow khor near Port Sudan, and Sal Lom, Red Sea Province, Jan. 22nd.

Jatropha lobata Müll. Arg. Sandy flats, Sal Lom, Red Sea Province, Jan. 23rd.

Phyllanthus rotundifolius Willd. Khor near Port Sudan, Red Sea Province, Jan. 25th.

URTICACEÆ.

Forskohlea tenacissima L. Hill slopes, Sal Lom, Red Sea Province, Jan. 23rd.

SALICACEÆ.

Salix Safsaf Forsk. Bir Mansura, Nadura, Khargeh, Feb. 11th.

MONOCOTYLEDONS.

LILIACEÆ.

Albuca Wakefieldii Baker. Slopes, 2500 ft., near Kamobsana, Red Sea Province, Jan. 25th.

Aloe abyssinica Lamb. Near Gebeit, Red Sea Province, Jan. 26th.

Asphodelus tenuifolius Cav. Slopes, 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

COMMELINACEÆ.

Commelina benghalensis L. Bed of khor, Port Sudan, Red Sea Province, Jan. 22nd.

CYPERACEÆ.

Cyperus effusus Rottb. Port Sudan, Red Sea Province, Jan. 21st. — *C. lævigatus* Roem. Along irrigation channels, Nadura, Khargeh, Feb. 11th. — *C. rotundus* L. Flats near Port Sudan, Red Sea Province, Jan. 22nd.

GRAMINEÆ.

Andropogon annulatus Forsk. Along irrigating channels, Tenida, Oasis of Dakhla, Feb. 14th.

Aristida adscensionis L. Port Sudan, and slopes, Kamobsana, Red Sea Province, Jan. 21st and 25th.—*A. plumosa* L. Sal Lom, Red Sea Province, Jan. 23rd.

Chloris virgata Sw. Flats near Port Sudan, Red Sea Province, Jan. 22nd.

Dactyloctenium ægyptium Willd. Port Sudan, Red Sea Province, Jan. 22nd.

Eragrostis ciliaris Link var. *arabica* Asch. & Schwein. Flats near Port Sudan, Red Sea Province, Jan. 22nd.—*E. plumosa* Lam. Kamobsana, Red Sea Province, Jan. 25th.

Heleochloa dura Boiss. Port Sudan, Red Sea Province, Jan. 21st.

Imperata cylindrica Cyrill. "Halfa," Mut, Oasis of Dakhla, Feb. 16th.

Melanocenchris plumosa Jaub. & Spach. Hill slopes, Red Sea Province, Jan. 23rd.

Panicum (*Digitaria*) *pennatum* Hochst. Slopes, 2300 ft., near Kamobsana, Red Sea Province, Jan. 25th.—*P. turgidum* Forsk. Slopes, Sal Lom, and Kamobsana, Red Sea Province, Jan. 23rd and 25th.

Pappophorum brachystachyum Jaub. & Spach. Slopes near Kamobsana, Red Sea Province, Jan. 25th.

Pennisetum ciliare Link. Port Sudan, and Kamobsana, Red Sea Province, Jan. 22nd and 25th.—*P. orientale* Rich. Slopes, 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

Sporobolus glaucifolius Hochst. Port Sudan, Red Sea Province, Jan. 21st. — *S. spicatus* Kunth. Port Sudan, Red Sea Province, Jan. 21st.

Tristachya barbata Nees. Slopes, Kamobsana, Red Sea Province, Jan. 25th.

FERNS.

Actiniopteris australis Link. Shaded slopes, 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

Cheilanthes arabica Decne. Shaded slopes, 2500 ft., near Kamobsana, Red Sea Province, Jan. 25th.

Notholæna languinosa Desv. Slopes, 2600 ft., Kamobsana, Red Sea Province, Jan. 25th.

Onychium melanolepis Kze. Shaded slopes, 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

MOSS.

Plagiochasma rupestre Steph. (= *Aitonia rupestre* Forster). Under cliffs, 2600 ft., near Kamobsana, Red Sea Province, Jan. 25th.

ALGA.

Enteromorpha intestinalis Link. On coralline rocks, shore near Port Sudan, Jan. 20th.

THE MUSSÆNDAS OF THE AFRICAN CONTINENT.

By H. F. Wernham, B.Sc.,
Department of Botany, British Museum.

(Concluded from p. 240.)

20. M. arcuata Poir. in Lam. Encycl. Méth. iv. 392 (1795). *M. arcuata* Poir. var. *parviflora* S. Moore in Journ. Linn. Soc. xxxvii. 301.

West Africa.—Sierra Leone: *Scott Elliot*, 5353! Togoland: *Büttner*, 145! N. Nigeria: Nupe, *Barter*, 1239! S. Nigeria: Old Calabar, *Robb*! Oban, *Talbot*, 203! 1052! Cameroons: *Preuss*, 405! Batanga, *Bates*, 436! Bipinde, *Zenker*, 2876! 3120! 3158! 4467! Yaunde, 2600 ft., *Zenker & Staudt*, 73! Johann-Albrechtshöhe, *Staudt*, 458! Fernando Po: *Mann*! Angola: Pungo Andongo, 2400–3800 ft., *Welwitsch*, 1120! 1121! Malange, *Gossweiler*, 1235! 1262! Kimbunda, *Gossweiler*, 2965!

Central Africa. — Niamniam-land: Roddo, *Schweinfurth*, 3840! Djur-land: *Schweinfurth*, 1742! Muhoroni, 4000 ft., *Battiscombe*, 288!

East Africa.—Uganda: Entebbe, 4000 ft., *Mahon*! Elgon, *James*! Nom. vulg. "Toki kuru"—Musozi, *Bagshawe*, 89! British East Africa: Mombasa, *Powell*! German East Africa: Usambara, Amani, *Warnecke*, 217! Derema, *Scheffler*, 203! Portuguese East Africa: Mozambique, Zonoe, R. Manica, 2500 ft., *Johnson*, 257! Near Kankanje and Magomero, 3000 ft., *Kirk*! (Livingstone Exped.). Zambesiland, Shire Highlands: *Buchanan*, 114! *Adamson*, 124! Sotchi, *Scott Elliot*, 8523! Nyasaland, &c.: *Buchanan*, 39! 404! 814! 1008! *Whyte*! Zomba, 2500–3000 ft., *Whyte*! *Manning*, 50! *Sharpe*, 148! Mt. Malosa (4000–6000 ft.), *Whyte*! Lake Nyasa, *Johnson*, 505! Unango to Mtonia, *Johnson*! British Central Africa: Namosi, *Cameron*, 9! South of Lake Tanganyika, 5250 ft., Fwambo, *Nutt*! Rhodesia: Gaza-land, Chirinda forest, 3800 ft., *Swynnerton*, 6636! Spungabera, 3700 ft., *Swynnerton*, 119! Hbb. Mus. Brit., Kew.

β pubescens Wernham, var. nov. Ramulis plus minus dense pubescentibus tarde glabrescentibus; *foliis* subtus sparse nisi densiuscule in vena centrali puberulis; *corollæ* tubo basin versus sæpe lineatim pubescente.

Angola: High plateau, *Gossweiler*, 4247! Central Africa: Bongo-land, *Schweinfurth*, 2891! 1742! East Africa: Uluguru, 3250 ft., *Goetze*, 208! Kundelungu, *Kassner*, 2585! 2608! Hbb. Mus. Brit., Kew.

This species occurs also in the Mascarine Islands (*supra*). The corolla is variable in size, as already pointed out (p. 233); a variety can scarcely, I think, be based on this as its only critical character, as in the case of the synonym quoted. The species may usually be distinguished by the mottled appearance of the upper surface of the leaves.

21. M. tenuiflora Benth. in Hook. Nig. Fl. 392 (1849).

S. Nigeria: West province, dry zone, *Kitson*! Eppah, *Barter*,

3308! Eket, *Talbot*, 3001! 3116! 3117! Old Calabar, *Robb*! *Thomson*, 86! *Holland*, 73! 81! *Williams*, 9! Oban, *Talbot*, 1050! Cross River, *McLeod*! Fernando Po: *Mann*, 60! *Barter*, 1232! 2068! *Vogel*, 67! Cameroons: *Preuss*, 879! 1165! Victoria, near seashore, at 2500 ft., *Kalbreyer*, 71! Hbb. Mus. Brit., Kew.

β LÆVIS Wernham, var. nov. Inflorescentiæ indumento omnino appresso, corolla extus sparsim strigillosa, appresse puberula v. subglabra tubo latiore.

Cameroons: Efulen, *Bates*, 219! Batanga, *Bates*, 437! Bipinde, *Zenker*, 1151! Angola: Golungo Alto, *Welwitsch*, 1117! Hbb. Mus. Brit., Kew.

22. **M. Holstii** Wernham, sp. nov. Ramulis sparsiuscule minute appresse puberulis, *foliis* ellipticis utrinque angustatis ca. 18 cm. × 8 cm. utrinque nisi in venis minute strigillosis glabris, petiolo appresse puberulo 2 cm., venis secundariis utrinque ca. 10–12, *stipulis* caducissimis; *inflorescentia* laxa pedunculis primariis 3–4 cm. longis qua ramuli minute ferrugineo-puberulis; *bracteis* mox deciduis; *calycis* lobis e basi latiusculo anguste lanceolatis valde acuminatis 5–6 mm. longis, extus rufo-sericeo-strigillosis, insuper glabratis; *corollæ* tubo valido ca. 3·5 cm. longo, insuper sub lobos ovatos breviter setaceo-acuminatos 6 mm. × 3 mm. ampliato, extus dense appresse pubescente.

Usambara: Mtai, *Holst*, 2470! Hb. Kew.

Near *M. ulugurensis*, but distinct in the lax inflorescence and shape of the corolla-lobes.

23. **M. ulugurensis** Wernham, sp. nov. Ramulis glabrescentibus, *foliis* ellipticis ca. 12 cm. × 5 cm. acuminatis utrinque acutis, utrinque nisi in venis minute pubescentibus glabris, venis secundariis utrinque ca. 10, petiolo sparsim piloso brevi; *inflorescentia* densiflora omnino dense minute pubescente, pedunculis 3 primariis 1·5–2·5 cm.; *calycis* lobis anguste lanceolatis 5 mm. longis in apicem subacutum leniter angustatis, v. uno in laminam petiolo raro 7–8 mm. excedente dilatato; *corollæ* extus dense pubescentis tubo validiusculo insuper leniter ampliato, ore 5 mm. lato, lobis oblongis 8 mm. × 3 mm. acutis nec acuminatis.

E. Tropical Africa: Uluguru Mt., 3900–5850 ft., *Goetze*, 187! Hb. Kew.

The affinity is with *M. tenuiflora*, but the new species is distinct, particularly in the shape and indumentum of the corolla.

24. M. CONOPHARYNGIIFOLIA Stapf in Journ. Linn. Soc. xxxvii. 104 (1905).

Liberia: Sinoe Basin, *Whyte*! Hb. Kew.

25. M. SOYAUXII Büttner in Verh. Bot. Ver. Brand. xxxi. 81 (1890).

Gaboon: Munda, Sibange Farm, *Soyaux*, 8! 14, 367! *Büttner*, 142; Hb. Kew.

26. M. ERYTHROPHYLLA Sch. & Thonn. Beskr. Guin. Pl. 116 (1828). *M. fulgens* R. Br. ex Tedlie in Bowdich, Mission, 374. *M. splendida* Welw. in Trans. Linn. Soc. xxvii. 36, t. 13.

Sierra Leone: *Smythe*, 5! Berea, Falaba, *Scott Elliot*, 5206! Kofiu Mt., *Scott Elliot*, 4608! Liberia: *Johnston*! Gola, *Bunting*! Gold Coast: Aquapim, *Reade*! Ashanti, *Tedlie*! (nom. vulg. "Dammaram") *Cummins*, 3 P! *Thompson*, 52! Cameroon: *Mann*, 1278! *Preuss*, 766! Buea, *Deistel*, 642! Yaunde, *Zenker & Staudt*, 30! 246! Johann-Albrechtshöhe, *Staudt*, 965! Bitye, R. Ja, *Bates*, 615! Mopanga, *Kalbreyer*, 93! Chari; *Chevalier*, 10,572! Congo Basin: *Bull*! Kasai, Lubefu Lusunbo, *Kassner*, 3318! Angola: Cazengo, *Gossweiler*, 752! Loango, *Soyaux*, 179! Pungo Andongo, *Welwitsch*, 1115! 1116! Bunhi, *Monteiro*! Central Africa: Niamniam-land, *Schweinfurth*, 3860! Monbuttu-land, *Schweinfurth*, 3639. Uganda: *Doggett*! Unyoro to Ankole, *Mrs. Tufnell*! Unyoro, *Brown*, 401! *Dawe*, 1028! Foweira, 3400 ft., *Bagshawe*, 1574! Hbb. Mus. Brit., Kew.

A climbing shrub, to a height of 40 ft., in the lowlands; a small erect shrub, 4–6 ft., at higher altitudes.

27. M. TRISTIGMATICA Cummins in Kew Bull. (1898), 74.

Gold Coast: Axim, *Johnson*, 877! Dajon, near Axim, in rain-forest, *Chipp*, 169! Ashanti, near Assin Yan Kumassi, *Cummins*, 41! 113! Kwalue, 2000 ft., *Johnson*, 716! Ivory Coast, Bingerville: Abidjean, Dabon, *Chevalier*, 15,173! Hbb. Mus. Brit., Kew.

28. **M. Zenkeri** Wernham, sp. nov. Ramulis glabratis v. pilis nonnullis arcte appressis indutis, *foliis* obovatis utrinque glabris breviter acuminatis basi acutis 11–16 cm. × 5–7·5 cm., petiolo sparsissime strigoso ad 2·5 cm. longo, venis secundariis utrinque 10–15, venis tertiariis tenuibus conspicuis flavo-albidis; *inflorescentia* pauciflora pedunculis primariis sparse strigillosis 3·5–5 cm.; *floribus* majusculis, *calycis* lobis oblongis parum acuminatis acutis ca. 1·5 cm. × 5 mm. extus fere glabris; *corollæ* tubo extus dense appresse piloso 3 cm. longo 4 mm. lato, limbo 3–4 cm. diam., lobis oblongo-ovalibus 1·8 cm. × 1 cm. apice rotundato; *ovario* sparsiuscule griseo-sericeo.

Cameroon: Yaunde, *Zenker*, 1516! 2600 ft., *Zenker & Staudt*, 422! Hbb. Mus. Brit., Kew.

The corolla resembles that of *M. elegans*, the nearest ally, the limb being of the ample, conspicuous type; but our new species is easily distinguished by the glabrous leaves and broad calyx-lobes.

29. M. ELEGANS Sch. & Thonn. Beskr. Guin. Pl. 117 (1828). *M. discolor* Thonn. ex DC. Prod. iv. 372. *Gardenia coccinea* G. Don in Edin. Phil. Journ. xi. 343 (1824). *Bertiera coccinea* G. Don, Germ. Syst. iii. 506.

Senegal: *Heudelot*, 806! Kangola, *Chevalier*, 850! Sierra Leone: *Afzelius*! *Barter*! *Don*! *Miss Turner*! *Vogel*, 51! *Whitfield*! *Wilford*! Sherbro, Regent, Lokko, *Scott Elliot*, 5795! 5871! 5817! Bagroo River, *Mann*, 844! Liberia: Gola Forest, Yumboo, *Bunting*! Gold Coast: *Johnson*! *Reade*! *Chipp*, 231! Cape Coast, *Brass*! Aquapim, *Vogel*, 841! Ewe, *Krause*! Togo: *Baumann*, 198! Lagos: *Macgregor*, 714! *Rowland*! *Dodd*, 418! Yoruba, *Moloney*! S. Nigeria: *Baikie*!

W. province, dry zone, *Kitson*! Old Calabar: *Holland*, 45! *Monteiro*! *Robb*! *Kalbreyer*, 147! *Thomson*, 125! *Williams*, 10! Oban, *Talbot*, 273! 1047! N. Nigeria: *Kentish-Rankin*! Gurara River, *Shaw*, 52! Lokoja, *Elliott*, 231! Anton, *Elliott*, 75! Nupe, *Barter*! Cameroons: Bipinde, *Zenker*, 921! 2586! 2971! 4557! Johann-Albrechtshöhe, *Staudt*, 942! Congo: Semlike, *Kassner*, 3077! Stanley Pool, *Johnston*! Angola: Golungo Alto, *Welwitsch*, 1119! Central Africa: Monbuttu-land, *Schweinfurth*, 3480! 3644! Uganda: *Dawe*, 653! 1019! 1064! Hbb. Mus. Brit., Kew.

A striking species, the bright scarlet or orange yellow corolla-limb attaining 6 cm. in diameter. This is notably in keeping with the fact that the calyx-lobes are not modified into an attractive lamina, the function of attraction being performed by the corolla (v. *ante*, p. 233).

β ROTUNDIFOLIA Wernham, var. nov. *Foliis* parvis suborbicularibus ca. 3 cm. × 2·5 cm. vel oblongis 3·5 cm. × 2·5 cm. petiolo 4 mm. longo.

N. Nigeria: Katagum, a woody twiner on rocks, *Dalziel*, 397! Hb. Kew.

The species may include other varieties. The following specimen, described as a small tree, is probably referable to the same species, but it bears fruits only and no flowers. If so, it may be regarded as the following variety:—

γ PSILOCARPA Wernham, var. nov. Pedunculis longiusculis, calycis lobis brevioribus, fructu oblongo glabro.

Lagos: *MacGregor*, 104! Hb. Kew.

30. M. HISPIDA Engl. Bot. Jahrb. viii. 66 (1887).

Congo: *Naumann*.

A lowly shrub, according to the description nearly related to *M. elegans*. I have not seen a specimen.

31. M. GRANDIFLORA Benth. in Hook. Nig. Fl. 392 (1849). *M. macrosepala* Stapf in Journ. Linn. Soc. xxxvii. 105.

Sierra Leone: *Don*! Liberia: Gola, forest scrub, *Bunting*! Begwan, *Bunting*, 146! Sinoe Basin, Kakatown, Monrovia, *Whyte*! Hbb. Mus. Brit., Kew.

Remarkable for the very ample calyx-lobes, attaining 2 cm. × 1 cm., and the stout corolla-tube, over 6 mm. in the widest part. As Hiern suggests (Fl. Trop. Afr. iii. 71), this may prove to be *M. rufa* A. Rich. in Mém. Soc. Hist. Nat. Par. v. 246 (1829).

SPECIES NON SATIS NOTÆ, DUBIÆ, VEL EXCLUDENDÆ.

32. M. RUFA A. Rich. in Mém. Soc. Hist. Nat. Par. v. 166 (1829).

Sierra Leone. It has been suggested that this may prove to be the same as *M. grandiflora* Benth. (see previous species). The original description is altogether inadequate.

33. M. ZANZIBARICA Bojer in Ann. Sci. Nat. Sér. ii. 264 (1835). *M. rufa* Bojer, *loc. cit.*, non A. Rich.

Recorded from dry situations in Zanzibar, *Bojer*. The whole plant is described as being clothed with red hairs; the flowers are white, with equal calyx-lobes. The original description is unfortunately insufficient to enable me to determine the affinities of this species.

34. M.? heinsioides Hiern in Fl. Trop. Afr. iii. 70 (1877). This is referred doubtfully to *Mussænda* by the author, and in the absence of flowers the genus is questionable. The general habit suggests this genus. The calyx-lobes are linear to spathulate and all equal, and the fruits are borne in groups of three.

Congo; *Christian Smith*, 59! Hb. Mus. Brit.

M. capsulifera Balf. fil. in Proc. Roy. Soc. Edin. xi. 836 (1882). Trans. Roy. Soc. Edin. xxxi. 116 (1888), t. 29.

Socotra: *Balfour*, 550! *Schweinfurth*, 455! 571. Hbb. Mus. Brit., Kew.

I am in considerable doubt as to whether this plant is properly referred to *Mussænda*, but for the present I prefer to reserve the question. The general facies and habit, the shape of the corolla, and especially the very small capsules with deciduous calyx-lobes, lead to the suggestion that this may represent a new genus. The mere fact, however, that the fruit is dehiscent does not preclude its inclusion in *Mussænda*; for two typical members of the latter genus—*M. luteola* and *M. Monteiroi*—bear loculicidal capsules.

M.? platyphylla Hiern. *loc. cit.*

This is, I think, undoubtedly referable to *Leptactina*, and we may adopt the name Leptactina platyphylla Wernham, comb. nov. The nearest affinity in *L. euosmia* K. Sch., from which this is readily distinguished by the roughish pubescence of the vegetative parts and the ribbed fruit.

Monbuttu-land: near Bongua, *Schweinfurth*, 3626! Hbb. Mus. Brit., Kew.

CAITHNESS PLANTS.

By Arthur Bennett.

1. Subularia aquatica L.—By Loch Stemster, Loch Rhuard, and between Lybster and Loch Rhuard with *Saxifraga Hirculus* L. and *Lobelia Dortmanna* L. (Mr. Lillie, *sp.*). Loch Chalinin and Loch Scye, Mr. Crampton (*Vegetation of Caithness*, p. 73). Known only from one station in the county before 1911. I have it from Shetland (Beeby, *sp.*) and the Outer Hebrides (Duncan, *sp.*), but do not think it has been found in the Orkneys. It is generally distributed in Sweden, Lapland, and over Finland to the extreme north, Iceland, and the Faroes.

2. Callitriche intermedia Hoffm., var. *homoiophylla* Gr. et Godr. Fl. Fr. i. (1848), p. 591 (*hamulata*), "Variété souvent stérile."—This seems to be by far the commoner form of *C. intermedia* in the North. Fries has a *C. tenuifolia* Nov. Fl. Suec. ed. i. (1814), p. 11, which Lönnroth makes a var. of *hamulata* Kuetz., quoting with a!; Fries, Fl. Scanica, 1835, and Persoon, Syn. Pl. 1805, where it was made a species. But there is no description in

the Fl. Scanica, p. 156; this occurs in the Nov. Fl. Suec. ed. 2, p. 280 (1828), where Fries refers it to Persoon. Mr. Williams, Prod. Fl. Brit. part 9 (1912), p. 509, makes this to be the *C. angustifolia* Hoppe. Taschenb. iii. p. 160 (1792), but some German authors refer it to *C. vernalis* Kuetz, and Hegelmaier, in his Monograph (1864), p. 56, remarks, "perhaps the same as *C. vernalis.*" Koch, Syn. ed. iii. (1857), p. 212, places it under *C. hamulata* Kuetz "*C. angustifolia* Hoppe, forma foliis omnibus linearibus." As Hoppe's name dates from 1792, if the plant is placed under *intermedia* as a variety it becomes *C. intermedia* Hoffm. var. *angustifolia* (Hoppe). There is no doubt the plant has a distinct look about it, but it is difficult to get absolute characters, unless the "Styli et bracteæ caducæ" against the "Styli persistenti" of *intermedia* is to be so considered. But *C. angustifolia* is so rarely found in flower, that it is difficult to confirm or deny this.

3. Utricularia vulgaris L.—In the Scottish Bot. Rev. (1912), p. 181, I recorded the above species as "Probably not characteristic." I had not seen specimens, and those submitted to Dr. Trail I supposed were not sufficient to decide on. But on p. 235 I was able to record it definitely, from specimens sent by Miss and Mr. Lillie from Loch Watten, which is on the eastern watershed of the county; it also grows in Achkisloch (or Stemster), which, although so near the east coast, belongs to the north-west watershed. See also Ann. Scott. Nat. Hist. (1911) p. 47.

4. Utricularia major Schmid. (*U. neglecta* Lehm.).—Loch, Rangag (alt. 375 ft.), and Loch Stemster (alt. 469 ft.), Mr. G. Little, *sp.* This is on record for E. and W. Ross, and the Outer Hebrides, and although the late Mr. Beeby had doubts (there being no flowers), I quite think that specimens he sent me from a "loch near Scalloway" will prove to be this rather than *vulgaris*, though he did not agree to this.

5. Ajuga pyramidalis L.—This species is far more widely dispersed over the country than was supposed. Mr. Crampton (*op. cit.*) records it from several stations with rosy-pink, white, and blue flowers, as "on talus below landslip at the Traigh Fhada (Long Beach) one mile north of Babbae, Berriedale; at Badsallock, north of Berriedale, on gravel talus; north bank of the Langwell River." The Rev. W. R. Linton also found it near Berriedale, and it occurs in several places up the Thurso River (Mr. Lindsay); this year Mr. Lillie has found it near Lybster. I have a specimen gathered by Mr. R. Heddle (10 June, 1847) at Dunnet. There are cultivated specimens from Dickson's garden at Broad Green, Croydon, "root from Ben Nevis," in the British Museum Herbarium.

6. Potamogeton Sturrockii A. Benn.—Stemster Loch, July, 1913, Mr. Lillie. It grows here with *P. alpinus*, *heterophyllus pusillus*, and *Friesii*. I now have this from co. 52. Anglesea, 86. Stirling, 89. Perth E., and 102. Ebudes S. It is rare in the United States, and I have not yet seen European specimens other than Scottish. Ascherson and Graebner, Syn. Fl. Mitt. Europ.

ed. 2 (1913), p. 530, have no European localities beyond "Schottland."

7. Isoetes lacustris L.—This was marked in a catalogue by Mr. Nicholson with a ?. Mr. Crampton (*l. c.*) records it from Loch More, Eileneach, Ganeinh, Lochan Dubh-na-Gaoive, Chalinin, Scye, and Shurrey. Occurs in Sutherland (Salmon), Shetland!, and Orkney!.

8. Cochlearia grœnlandica L. — Short turf on Holborn Head, July 14, 1897, E. S. Marshall, *sp.* This seems to have somehow been omitted in my former papers,* although recorded in the Supplement to Top. Bot. It is a plant that might be expected occurring in Ross!, Sutherland!, the Outer Hebrides!, Orkney! and Shetland!.

SHORT NOTES.

Rumex salicifolius in South Lancashire. — A number of plants of this species occurred last year in a clover-field near Walton Prison, Liverpool. It is a North American species which has recently occurred in several localities in Germany and the Netherlands. The name has been confirmed by Dr. Thellung, of Zurich. It is not unlike a slender form of *R. crispus* in the field, but is of a paler yellowish green, and when in flower its anthers are conspicuously yellow tinted, deepening to orange after anthesis. They are white in *R. crispus.* The leaves are subcartilaginous, recurved, linear, not crisped, but slightly undulate at the margins, and have a very willow-like appearance. In the same field numerous other aliens appeared from time to time last year, and this including *Papaver Rhœas* L., *Sisymbrium pannonicum* Jacq., *S. orientale* L., *Silene dichotoma* Ehrh., *Melilotus officinalis* Lam., *M. alba* Desv., *M. Petitpierreana* Hayne, *M. indica* All., *Trifolium pratense* var. *americana* Harz, *Œnothera Lamarckiana* Ser., *Daucus Carota* L., *Artemisia Absinthium* L., *Potentilla norvegica* L., *Chenopodium opulifolium* Schrad., *Rumex dentatus* L., and *Cynosurus echinatus* L. I have seen no previous British record for *Rumex salicifolius.*—J. A. Wheldon.

Festuca rottbœllioides Kunth in South Lancashire.—In preparing the Flora of South Lancashire it has been necessary to visit all kinds of localities, whether botanically interesting or uninteresting. The portion of the Mersey shore near Garston belongs decidedly to the latter category. Mr. W. G. Travis, the Secretary of the South Lancashire Flora Committee, decided to pay a long postponed visit to this part of our area on July 19th, and was rewarded by the discovery of this grass on the river-wall at Garston Docks. It occurs in considerable quantity, and there is no reason to doubt that it may have been an original plant of the rocky shores hereabout prior to the building of these walls. Its only associates were native plants, such as *Plantago coronopus*, *Alsine media*, *Sagina maritima* var. *prostrata* Towns., &c. There is no Lancashire record for it in Green's *Flora of Liverpool*, but it was found many years ago by Dickinson at Parkgate, in Cheshire. It has long been known as a plant of West Lancashire, where it was found near Bare by Mr. Newton, as recorded by Ray in 1688—the first British record. It probably still occurs on the North Yorkshire coast, near Coatham, but it has long disappeared from near the old pier at Scarborough, whence it was recorded by Bean.—J. A. WHELDON.

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* Scott. Nat. 1888, 305 and 357. Ann. Scott. N. H. 1892, 247; 1900, 108; 1904, 224; 1910, 225; 1911, 44.

TRAGOPOGON MINUS Mill., FORMA.—Early in July this year there was a considerable quantity of this plant growing in the turf on Selsley Hill, above Stroud, Gloucestershire. It is a very much dwarfed form of compact growth. I was attracted to it by the very large heads of pappus (1¾ in. high and 2 in. broad) which were growing at about the same height above the ground that one sees dandelion clocks. I gathered a number of plants and measured them from the ground level to the distal end of the pappus. The great majority were 6 to 7 in. in height, the smaller ones 5 in., and a few large ones reached 9 to 10 in. They had not been nibbled by sheep. The stems were either simple and one-flowered, or with a short secondary scape arising within an inch of the base of the stem, and bearing one flower. This was usually in bud or just opening when the first flower had ripened its seeds. The flowers are rather shorter than the involucre, and the fruit agrees with the description in Babington's *Manual*, ed. 9. I have not met with this form before; the ordinary roadside plant is from 2 to 2½ ft. high and much branched.—ELEONORA ARMITAGE.

RHINANTHUS MONTICOLA Druce IN MID-WEST YORKSHIRE (v.-c. 64).—I found this plant in quantity on July 27th this year near Malham, at about 1250 ft. It grows in the turf over a wet moory area, about half a mile square, near the head of the Gordale Beck, frequently in close association with *Bartsia alpina*. I do not think the plant has been previously recorded for the West Riding. The specimens agree closely with the description given in the article by the Rev. E. S. Marshall in this Journal in 1903, p. 297, and are for the most part about four inches in height, exceptionally reaching five and a half inches. The main stems bear from eight to thirteen or fourteen pairs of leaves (excluding the floral leaves), and from three to five flowers or fruits. The curious colouring of the corollas, well described as "treacly yellow," attracts the eye at once. Usually the whole plant was much bronzed, becoming purplish bronze in the fruiting-calyx.—A. E. BRADLEY.

REVIEWS.

Die Palaeobotanische Literatur. Vol. iii. (1910, 1911, and Appendix to 1909). Edited by W. J. JONGMANS. Jena: G. Fischer. 8vo, pp. 569. Price 26 marks.

THE third volume of Dr. Jongmans' bibliographical review of palæobotanical literature deals with the work published in the years 1910 and 1911, together with some additions to the previous volume. It is of a still larger size than the previous volumes, and the enormous number of papers referred to, and of plants mentioned in these papers, is the best vindication of the usefulness of such a work and demonstration of its value. When we look through the pages of these volumes, we cannot fail to be struck with the immense amount of literature dealing with fossil plants which is published annually and scattered in such diverse periodicals that some of it may elude the vigilance even of the specialist. While the most industrious botanist finds it difficult to keep in touch with all the literature of his special subjects, the painstaking work of Dr. Jongmans makes it possible for anyone to ascertain easily the year's work on palæobotanical subjects, or on any fossil plant or group of plants. This should be especially useful for those whose work does not bring them very extensively into contact with palæobotanical memoirs, but who are studying plants allied to some of the fossil forms. For example, opening the volume before us at random, we find no less than eighty-one references to species of *Myrica*, belonging to periods between Cretaceous times and the present day; many of these might escape the notice of a worker on this genus.

In England, we too often fall into the error of associating Palæobotany only with the study of Carboniferous plants, and of forgetting that it includes the study of all ancient plants whose remains are found buried in the earth. But though the papers on Carboniferous plants mentioned in the present volume are the most numerous, yet they do not form much more than a quarter of the total number of the papers recorded. In this connection it is interesting to notice the numbers of papers dealing with the plants of the different periods. In this volume the number of papers quoted as dealing with Devonian plants is 14, Carboniferous plants are dealt with in 152, Triassic in 29, Jurassic in 42, Cretaceous in 80, Tertiary in 100, and Quaternary in 135, the figures being approximate in each case. While a large percentage of the papers on Palæozoic plants come from the hands of English botanists, only seven out of the one hundred and thirty-five papers which deal with Quaternary plants originated in this country. It is much to be regretted that English botanists take so little interest in the plant-remains in comparatively recent deposits, such as peat and the ancient forest beds of pre- and post-glacial age, for this study almost certainly provides the key to many problems of the distribution of our plants. For example, the presence of the Lusitanian flora in the West of Ireland may well be due to the warmer winters of a milder post-glacial period, of which there is some evidence. This study not only throws interesting light on the distribution of many elements in our flora, but also on the past histories of many individual plants. Some idea of the activity of Continental workers in this field may be obtained by the perusal of a volume which has provided many references in Jongman's list, *viz.*, the work published by the Stockholm International Geological Congress entitled *Die Veranderungen des Klimas seit dem Maximum der letzten Eiszeit.*

In other fields we notice that the literature quoted includes papers on Tertiary plants found in many different localities, such as Java, Crete, and California. The most noteworthy work of the two years on Mesozoic plants was in the papers of Kidston and Gwynne Vaughan on the Fossil Osmundaceæ, Nathorst on some members of the Bennettiales, and Jeffrey on some Conifers. Among the advances in our knowledge of Palæozoic plants during the period, we are especially reminded of the work of Prof. Oliver and Mrs. Arber on the Gymnosperm seeds, and of the work of Paul Bertrand and W. T. Gordon on some of the curious Palæozoic ferns.

But the importance of Jongman's bibliographical review does not lie in reminding us of the more important work of the period, but rather in the analysis of the hundreds of smaller papers which are not readily accessible, and which we should probably never see. The species-index often reveals references in papers where these might be least expected. Undoubtedly the use of these bibliographies will not only save labour, but make for thoroughness and completeness in the work of many botanists, and it is to be hoped that the issue of the volumes will be continued.

H. H. T.

Flore du Bas et du Moyen-Congo: Études de Systematique et de Géographie Botanique. Sér. v., Tome iii., Fasc. iii. Par Emile de Wildeman. Brussels. Nov. 1912.

It is now some years since M. de Wildeman began a systematic study of Congolese botany as represented in the Brussels Museum by consignments of plants from Belgian lovers of Nature, for the most part officers of the Congo State, who have devoted their leisure to the praiseworthy object of bringing to light the vegetable treasures of that large and still imperfectly known portion of the African continent. Like all its predecessors, this "Étude," issued in the well-known sumptuous form and beautifully illustrated, is complete in itself, and contains a full index, not only of scientific but also of vernacular names. Though for certain groups the services of experts have from time to time been enlisted, the brunt of the labour involved has fallen upon M. de Wildeman himself, whose studies have therefore, of necessity, been wider in their scope than is usual in these days of high specialization. He has been further handicapped by want of access to the large number of type-specimens, whose preservation in this country and at various Continental centres has resulted from the activity of explorers, British, German, and French, in territories bordering on the Belgian Congo, which have a flora in many respects similar to its own. That some bad species should have been made was, in the circumstances, inevitable, and it says much for M. de Wildeman's courage and devotion that he has not been deterred by this from pursuing the object he had in view and bringing it so far on the road to realization.

In the publication under notice will be found an exhaustive study of the Congo species of *Dioscorea*, a genus of which the economic importance justifies the seventeen plates employed to illustrate them; also many descriptions of new species, together with new localities for known ones, belonging to most of the natural orders of plants found in the Congo territory. We do not like such terms as "Labiataceæ" and "Compositaceæ"; too high a price may be paid for a uniform system of nomenclature.

S. M.

Forestry for Woodmen. By C. O. Hanson. Pp. 222. With 12 plates and 15 text-figures. Clarendon Press. Price 5*s.* net.

A manual of forestry in half-a-dozen bulky and costly volumes is not only a contradiction in terms but is also obviously not to be possessed by mere woodmen. The woodman's requirements are, moreover, in many respects different from those of the forester. It is desirable that he should know the main principles upon which his practice depends, and all that he can as to the practical rearing and tending of woodland and the measurement and utilization of its produce. Matters of forest policy, working plans and finance are rather the province of the higher forest officer. As, however, the well-trained and experienced woodman may aspire to rise in his calling, Mr. Hanson may be justified in devoting one chapter in this well-planned little book to such topics. His book was, he tells us, first drawn up for the use of the School of Forestry for Working Men in the Forest of Dean; and we think that, in the recent revival of the study of forestry, no work has been produced in this country that so meets the requirements of such students as does this. It makes no pretence to originality, the preface modestly acknowledging indebtedness to Sir W. Schlich's *Manual*, Mr. Pinchot's American *Primer*, Dr. Nisbet's edition of Brown's *Forester*, Mr. Simpson's *New Forestry*, and other works; but, while fully adapted to English requirements, the book has received from its writer's thorough training a scientific character which is independent of mere locality. Starting with the life of a tree, it goes on to deal with climate and soil, pure and mixed woods, nursery management, planting, methods of treatment and protection from destructive animals and plants, frost, drought, storm and fire, fencing, draining, felling, &c., with brief but adequate sylvicultural notes on the species commonly grown in England.

Printing and binding are creditable to the Clarendon Press, and the book is certainly inexpensive. Cheap as it is, however, we doubt whether the photographic illustrations of woodlands, which must add appreciably to its price, serve any really useful purpose that is not fully met by the text.

We hope that the book will find its way, not only into the hands of the woodmen in our larger State woodlands, but also into the libraries of secondary and even primary schools in wooded regions. Its sixteen chapters would furnish themes for a useful course of as many lectures.

G. S. Boulger.

ISLE OF WIGHT PLANTS.

By Frederic Stratton, F.L.S.

The Isle of Wight having been included by Mr. Townsend in his *Flora of Hants* (second edition, 1904), there is little probability of a separate flora of the island being published. An account of the flowering plants and ferns and their allies, which I wrote in 1908, was published as part of *A Guide to the Natural History of the Isle of Wight*, edited by Mr. Frank Morey, F.L.S., in February, 1909, and these notes may be taken as an appendix to that account, and also to Mr. Townsend's *Flora*.

The districts in which the plants occur are those of Townsend's *Flora*, namely: IV. North Wight, 1, 2, 3, 4, and V. South Wight, 1, 2. These districts are bounded by the water partings generally, but in at least two instances this is not so; the portion of the southern slopes of the chalk downs west of Freshwater Bay belong strictly to subdistrict V. 1, and not to IV. 1, and the eastern boundary line of subdistrict IV. 3 does not quite follow the water parting between Arreton Down and Budbridge. For convenience sake the order of Townsend's *Flora* has been followed.

Clematis Vitalba L. Mr. Townsend says of this, "not confined to the chalk," and this is so, but in the island it is confined to the chalk and limestone. Wherever it is seen in the island off the chalk it is a sure indication that limestone comes to the surface there. Is this the case in other parts of England?

Thalictrum flavum L. There is a strange error in Townsend's *Flora* as to this plant. It has always been extremely rare, and no island specimens, as far as I know, are in existence. The entry under "IV. (N. Wight) (1) Totland Bay, abund. B. (Stratton)" must be a slip, for which I am not responsible, for some other plant. I fear the plant is extinct at Wootton, as I have repeatedly searched in vain for it. In Major Smith's copy of Bromfield's *Flora Vectensis*, there is a MS. note, "formerly in Lee meadows but now extinct, E. M."

Ranunculus sceleratus L. This plant has a very striking resemblance to a Batrachian *Ranunculus* when it is seen growing in water early in the year (February 7th in my specimens) with only floating leaves, which much resemble very large leaves of *R. tripartitus*.

R. Flammula L. The procumbent rooting state, *pseudo-reptans* Syme var. *radicans* Nolte, is a very different plant from *R. reptans* L., which throws out rooting stems in all directions, whilst the stem of *R. pseudo-reptans* roots in one direction only. (See Journ. Bot. 1869, 315.)

Helleborus viridis L. The entry in Townsend's *Flora* under *H. fœtidus*, "near Blackbridge Haven Street," belongs to *H. viridis*, which plant may possibly be a relic of cultivation both at Blackbridge and also in the locality at Alverstone Whippingham, but in the latter locality I saw it in 1868 and 1869 growing in great abundance over a considerable area in Woodhouse Copse.

Aquilegia vulgaris L. District IV. 3. Pan Down, near Newport, amongst furze and hawthorn bushes; copses, East Standen.

Aconitum Napellus L. Still flourishing in both the localities given in Bromfield's *Flora*; the date appended to the specimen in his herbarium is June 11th, 1840.

Fumaria. How many of the newly described species can be identified as occurring in the Isle of Wight I am not able to say. It would take probably some years of observation and examination. Out of the thirty-six species in Mr. Pugsley's list at the end of his account of the genus in Britain only four of our island Fumarias remain with the same names as those recorded in Townsend's *Flora*, namely, *F. Boræi*, *F. muralis*, *F. officinalis*, and *F. Vaillantii*, the only station for *F. Boræi* being that "between Cockleton and Gurnet Bay; Herb. Br. Mus. (Pugsley, 1903)." For *F. Vaillantii* Lois. only one doubtful record by Dr. Bell Salter in 1855. And for *F. densiflora* DC. only one record (1865). It is evident that a good deal has to be done in the island as elsewhere in regard to this genus. In my younger days as a botanist I was an enthusiastic "splitter"; now, from lack of youthful energy probably, I seem to be more inclined to be a "lumper," though I quite appreciate the careful and acute observation of many of the botanical brotherhood.

Crambe maritima L. Plants have been observed in June, 1906, on the western shore of Newtown Creek, and in 1907 on the eastern side. Possibly all the plants noted as occurring in the Isle of Wight have been derived from seeds floated across the Solent from Calshot, where it has been known as abundant for many years. The first notice of it as an Isle of Wight plant is in Morison's *Plantarum Historiæ Universalis Oxoniensis*, 1680.

Sisymbrium Sophia L. I found this plant in 1867 growing on waste ground, now built over, at St. John's, near Ryde. In July, 1907, specimens from Alverstone, near Newchurch, were sent to me, no doubt casuals.

S. Irio L. In August, 1875, this plant occurred on the site of an ancient wall in Newport, pulled down in 1874. It has not been noticed since.

Matthiola incana R. Br. Still as abundant as ever on the chalk cliffs from Freshwater Bay to Compton. There is some difficulty as to which of Mr. Townsend's districts this locality is in. And he must have felt the difficulty, as he puts it under both "IV. N. Wight (1)" and "V. S. Wight (1)." The difficulty arises from the fact that the downs from Compton to the Needles slope to the cliffs form the water-parting, and consequently, according to the description of the districts in the *Flora*, all the plants of the cliffs and of the downs south of the water-parting are in District V. S. Wight (1), whilst Townsend puts many of them under District IV. N. Wight (1).

Nasturtium officinale R. Br. IV. 3. East bank of Medina below Newport.

N. palustre DC. IV. 3. Between Shide and Pan, near Newport.

Alyssum calycinum L. The locality, "Bury Hall, Alverstone," is not in District "V. (S. Wight) (2)" but in VIII. (Hants) (3).

Thlaspi arvense L. IV. 3. Near Westmill, Newport; arable field at Whitcombe.

Lepidium Draba L. IV. 1. Yarmouth.

Viola lactea Sm. IV. 1. Heath east side of the Freshwater Yat, near Beckett's Copse.

V. odorata L. The white variety is by far the commonest. In some seasons (especially 1904) I have seen copses on the chalk downs white with them. The variety with reddish purple flowers occurs in a few localities, but the blue-flowered variety I have never seen in the island. In this genus, again, there appears from Mrs. Gregory's book to be ample scope for minuter observation.

Dianthus Armeria L. Mr. W. Reeves sent me a specimen in September, 1888, from a locality near Alverstone, which is probably the same locality as that in which it was found in 1848.

Saponaria officinalis L. Occurrence at Yaverland recorded by Dr. Bromfield before 1850; at Brighstone by Mr. R. Tucker, 1865. In both localities it maintains its ground in hedges. It has also been established for many years in a hedge at Watergate, near Newport.

Cerastium pumilum Curt. IV. 2, IV. 3, and IV. 4. Freshwater Down, Arreton Down, and, I believe, on the whole of the chalk down range from the Needles to Bembridge. But it is sometimes difficult to distinguish this plant from small states of *C. tetrandrum* Curt.

Myosoton aquaticum Moench (*Stellaria aquatica* Scop.). IV. 3. I had searched unsuccessfully for this between Shide and Blackwater from 1864 to 1872, when, in the latter year, the banks thrown up from the side of the stream for the railway were covered in various places with it.

Herniaria hirsuta L. Occurrence at St. Lawrence in 1910, recorded in Journ. Bot. 1912, p. 378.

Montia fontana L. IV. 3. St. George's Down, Staplers. There is no District "IV. (5)."

Geranium pyrenaicum Burm. (*perenne* Huds.). IV. 3. In considerable quantity in two places in high hedge-banks near Merston.

G. columbinum L. IV. 1. Totland Bay.

G. striatum L. IV. 4. King's Quay Copse, naturalized; hedge near Wootton Bridge.

G. sanguineum L. IV. 4. Waste ground, St. John's, near Ryde.

Rhamnus Frangula L. IV. 4. King's Quay. V. 2. Shanklin.

R. Alaternus L. IV. 3. Established for many years in a hedge which divides Pan Down from St. George's Down. The trees flower abundantly, but I have not seen ripe fruit.

Melilotus altissima Thuill. This plant, which has hitherto been rather uncommon, is now found in great abundance, especially in Districts IV. 1. Totland, IV. 3. Newport.

Trifolium arvense L. IV. 1. Totland. IV. 3. East Cowes.

T. scabrum L. IV. 3. Carisbrooke Castle, Bowcombe Down. V. 2. Arreton Down.

Vicia bithynica L. IV. 2. Gurnard; "rough grassy ground near Gurnard Bay, close to the beach . . . in the same locality *Luzula Forsteri*, *Lathyrus Nissolia*, . . . and *Carex pendula*," J. F. Rayner, August 3rd, 1907.

Lathyrus pratensis L. var. *villosus* Schleicher. V. 2. St. Lawrence, G. C. Druce, Journ. Bot. 1906, p. 394.

L. sylvestris L. V. 2. Kerne; the very broad-leaved variety, which seems to have been sometimes recorded as *L. latifolius* L.

Spiræa Filipendula L. IV. 1. High Down, Freshwater.

Agrimonia odorata Mill. IV. 3. Bagwich. Pan, Newport.

Poterium polygamum Wald. & Kit. (*muricatum* Spach.). IV. 3. Bowcombe Down.

Rubus radula Weihe subsp. *anglicanus* Rogers. Recorded under District V. 2. "Romsey." Romsey is in Hants. I am not aware of any place so named in the Isle of Wight.

R. dumetorum W. & N. var. *ferox* Weihe. Wootton Creek is in District IV. 4, not V. 2.

There is much collecting and identifying of Rubi to be done in the Isle of Wight for those who can recognize the 133 species and the 66 varieties or subspecies of brambles, as set forth in Mr. Druce's *List of British Plants* (1908). This remark applies also in a lesser degree to the roses. In Townsend's *Flora* the Rev. W. Moyle Rogers has given us the results of his study of these critical genera, both in Hants and the Isle of Wight.

Sedum dasyphyllum L. V. 2. Lake near Sandown (1875).

Saxifraga tridactylites L. IV. 3. Walls, Newport. V. 2. Godshill. This is a plant which in some years occurs in vast abundance in spots where in other years it is hardly or not at all to be found, as St. George's Down, 1869 and 1877, Carisbrooke Castle north trench, 1902 and 1912.

Sambucus nigra L. IV. 3. The variety with pale yellowish fruit grows near Carisbrooke Castle.

Asperula odorata L. IV. 3. Copses, East Standen; Alvington. IV. 4. Long Lane Copse.

Crucianella stylosa DC. IV. 1. Tennyson's Lane, Freshwater. V. 2. In the undercliff. An outcast from cultivation in all its habitats.

Valeriana dioica L. IV. 3. Wet field between Watergate and Carisbrooke.

Valerianella olitoria Poll. IV. 3. Hedge-bank between Newport and Watergate.

V. eriocarpa Desv. IV. 3. Last year I found this growing in abundance at Carisbrooke (see Journ. Bot. 1912, 231). This year I watched the locality, and up to May 22nd I could not find a single plant. On May 11th last year the plant was in great profusion; from May 22nd this year to June 12th I found just one or two plants. On June 20th and since not a single plant.

Carduus arvensis Robson var. *setosus*. IV. 3. Bank of new road, Newport (see Journ. Bot. 1911, 275). Many plants this year.

Matricaria suaveolens Buch. IV. 2. Apes Down. IV. 3. In many localities near Newport and elsewhere. The extraordinary rapidity with which this plant has spread itself in the island is quite unaccountable, as also is its abundance, though there is less in quantity this year.

Achillea Ptarmica L. IV. 3. Abundant in pasture near East Medina Mill; Staplers; Mount Misery.

Artemisia Absinthium L. Does not occur north of the chalk range. Many localities are given by Dr. Bromfield in the *Phytologist*, vol. iii. 437–490, but none in the *Flora Vectensis*. V. 1. Chale Green. V. 2 Luccombe; Bordwood.

Filago apiculata G. E. Smith. IV. 3. Arable field above Idlecombe. I have a note, "Wight, Newbould, Top. Bot. edn. 2, Supplement," but I do not know to what locality it refers.

F. minima Fries. IV. 1. Headon, Freshwater.

Gnaphalium sylvaticum L. I have never met with this species in the Island.

Senecio sylvaticus L. IV. 3. Abundant on St. George's Down.

S. campestris DC. IV. 2. Plentiful over a considerable area on the S.E. (not "Western") extremity of Westover Down, but not found elsewhere except on Afton Down, where it is very scarce, if it still exists. I have not seen it on Afton Down since 1883.

Bidens cernua L. and *B. tripartita* L. both occur sparingly in and near the Medina stream close to Newport.

Inula crithmoides L. IV. 3. Bank of Medina River at Werrar; below Newport, west side.

I. Helenium L. IV. 3. King's Quay.

Petasites fragrans Presl. IV. 3. Naturalized and greatly increasing in many localities. The flowering time here is from the middle of December to the end of January.

Cichorium Intybus L. V. 1. Compton.

Hypochæris glabra L. IV. 1. Headon, Freshwater.

Picris hieracioides L. var. *gracilis* Jord. IV. 2. "Apes Down; also (V. 2) near St. Lawrence." G. C. Druce in Journ. Bot. 1906, p. 394.

Taraxacum officinale Weber, var. *erythrospermum* Andrz. IV. 3. Newport; Standen.

Lactuca virosa L. V. 2. The two records in Townsend's *Flora* probably relate to the one locality near Winford Firs, where I saw it growing in 1875.

Crepis taraxicifolia Thuillier. IV. 1. Totland Bay, 1879. In the *Supplement* to the second edition of *Topographical Botany* the record is "Wight. J. Groves."

C. setosa Hall. IV. 1. Totland Bay, 1879.

C. biennis L. IV. 1. Totland Bay, 1879,

Hieracium pilosissimum Fries *Peleterianum* Merat. All my specimens from Freshwater are thickly clothed with long brown hairs and felt, and very much resemble a plant distributed by Billot in his *Flora exsiccata*, under the name *Hieracium mixtum* Fral. ap. The hairs and felt of *H. pilosella* are whiter. A very hairy form of *pilosella* grows at Carisbrooke Castle. The island is not rich in Hieracia, as out of the 133 species and 146 varieties of Hieracia given in the tenth edition of the *London Catalogue*, only six have been recorded as occurring in the island. But this may be partly due to the lack of skilled observers of the genus.

Campanula patula L. and *C. Rapunculus* L. should both be dropped out of the list of Isle of Wight plants, as, though once recorded as having been found in the south of the island, neither plant has been observed here during the past seventy years.

Vaccinium Myrtillus L. IV. 3. Marvel, near Newport; St. George's Down.

Monotropa Hypopitys L. IV. 3. Carisbrooke Castle. IV. 4. Firestone Copse; Nunwell.

Gentiana Amarella L. b. *præcox* Raf. V. 2. South slopes of down above Steephill. This is the only locality in which I have seen this plant growing (first on May 27th, 1878). Mr. Tucker's plants from Afton Down (May 25th, 1864) are *G. campestris*. Captain A. Steuart reported finding *præcox* on May 16th, 1889, on "the down above Bonchurch," and on May 18th, in the same year, on the "slopes south of the monument on Bembridge Downs." I have not seen Captain Steuart's specimens, but in Townsend's *Flora* the record is "Ventnor Downs; J. H. A. Stewart (Herb. Salmon)." A specimen distributed by Billot as "*G. Amarella* L., from Mark Brandenburg (Prusse) 7 Août, 1851," is this plant.

G. campestris L. IV. 1. Colwell Heath. A few plants observed in 1879, since which date it has often been searched for in vain, both at Colwell and on Afton Down. There ought to be no confusion between this plant and the preceding one, as that is clearly closely allied by its flowers to *G. Amarella*.

Menyanthes trifoliata L. IV. 3. Between Gatcombe Mill and Blackwater.

Convolvulus Soldanella L. V. 2. Below the cliffs west of Sandown.

Atropa Belladonna L. IV. 2. Chalk pit at Westover. IV. 3. Garden of Nodgham, Carisbrooke.

Datura Stramonium L. IV. 3. Railway embankment between Newport and Shide (1873).

Verbascum Blattaria L. IV. 3. Field south of Marvel Copse, with yellow flowers (1878).

Mimulus luteus L. (*Langsdorfii* Donn.). IV. 3. Gatcombe (1904); The Wilderness (1912). V. 2. Peartree (1891); Alverstone, 1904.

Veronica Buxbaumii Ten. (*Tournefortii* C. Gmel.) This plant, which appears to have been first noticed in the island about 1840 (it had not been seen by Bromfield up to November, 1840), is now to be found, probably, in every arable field in the island, a striking instance of the rapid and complete naturalization of an alien plant.

V. agrestis L. In Townsend's *Flora* the record is "IV. (N. Wight), com. in all the sub-districts. V. (S. Wight), com. in sub-district (1). (2) Niton; Rogers." I doubt its being common, and I believe I have never found it in the island. Unfortunately I lent, at his request, in June, 1911, my packet of Veronicas, fifty-four sheets, to Dr. Ernst Lehmann, of Kiel, who informed me that he was engaged on a monograph of the genus *Veronica*; I have never been able to get this packet returned to me, but he informed me that none of the plants in the packet were *V. agrestis.*

V. montana L. IV. 3. Copse little Pan, near Newport.

Lathræa Squamaria L. V. 2. "Edge of cliff in Sandown Bay (1870); F. Stratton (Br. Mus. Herb.)." A curious error, as I certainly never saw the plant in that locality, nor anywhere in District V. 2. [There is no specimen from this locality in the British Museum Herbarium.—Ed.]

Orobanche Picridis F. W. Schultz. An *Orobanche*, which I have failed to distinguish from this, was growing on *Crepis virens*, on the chalk down above Cheverton (Dist. IV. 2) this year. In 1868 Mr. J. G. Baker recorded finding *O. minor*, "Apes Down, on *Crepis virens*," a locality very much the same as the one above.

Lycopus europæus L. IV. 3. Ford Mill, Newport.

Mentha rotundifolia Hudson. IV. 3. Between Marvel and Blackwater.

M. rubra Sm. V. 2. Whitwell (G. C. Druce in Journ. Bot. 1905, 394).

M. Pulegium L. The locality given in Townsend's *Flora*, IV. 3. "Plantation on left hand, approaching Carisbrooke Castle from Newport," is no doubt an error, as the plantation is on bare chalk.

Calamintha menthifolia Host. var. *Briggsii* Syme. V. 1. Shorwell Shoot. I have no doubt that this plant and Bromfield's *C. sylvatica* are the ones we get in the island, but we also have very characteristic plants of typical *menthifolia* var. *α genuina* of Boswell Syme (Engl. Bot. ed. 3, vii. 34). They agree with the plants distributed by Billot as follows: Bromfield's *C. sylvatica* is *C. officinalis* Moench, Billot's specimens being from "les jeunes tailles du calcaire jurassique inférieur à Liverdun près de Nancy." I found the same plant near the Beatenhöhle, on the north side of the Lake of Thun. This is, I presume, *Clinopodium grandiflorum* O. Kuntze. *C. menthifolia* Host. var. *Briggsii* Syme is *C. ascendens* Jordan, which Billot sent from "Lieux secs et pierreux avec ses congénères aux environs de Lyon." I conclude that *Clinopodium Calamintha* O. Kuntze includes both *Calamintha menthifolia* Host. and Syme's var. *Briggsii.* Referring to Townsend's note under *C. sylvatica* Bromf., I may add that this plant grows and seeds very readily in gardens and greenhouses, as it has done spontaneously in mine for over forty years past.

Nepeta Cataria L. IV. 1. "Sconce Tower" (Snooke's *Flora Vectiana*) is between Colwell and Norton.

Scutellaria minor L. IV. 3. Sullens, near Newport.

Lamium hybridum Vill. IV. 3. Between Marvel and Whitecroft (1869); St. George's Down.

Lithospermum officinale L. IV. 3. Shide; Pan Down, near Newport.

L. arvense L. IV. 2. Arable field adjoining Barkham's Copse, Carisbrooke.

Lycopsis arvensis L. IV. 1. Headon.

Pinguicula lusitanica L. IV. 1. The habitat given in Townsend's *Flora* under "V. (S. Wight) (1) Colwell Heath," should be IV. 1; but the only part of the heath where I saw it growing in 1867 and 1869 has long since been enclosed as the garden of a house. V. 2. Bohemia (1908, 1910, E. W. Pollard).

Utricularia vulgaris L. IV. 1. In flower in "ditches in the marsh near Easton," August 12th, 1867 and since, and August 22nd, 1906.

Lysimachia nemorum L. IV. 3. Staplers. IV. 4. Osborne.

Anagallis tenella Murray. IV. 3. Sullens, near Newport.

Centunculus minimus L. IV. 3. St. George's Down.

Statice Limonium L. forma *pyramidalis* Salmon. IV. 3. Near East Medina Mill.

S. humilis Salmon. "IV. 4. Wootton Creek, 1860," H. Trimen, Herb. Mus. Brit.; King's Quay. IV. 3. Near East Medina Mill.

S. humilis × *Limonium* (× *S. Neumanni* Rouy). IV. 1. By the Yar, Freshwater. IV. 3. Near East Medina Mill.

Polygonum Bistorta L. V. 2. "Mottisfont" is near Romsey, Hants; there is no place of that name in the island.

Hippophae rhamnoides L. Has been largely planted at Totland Bay. The only place in the island in which it has the appearance of growing wild is St. Helen's Spit, but that locality rests under suspicion, since both Bromfield and A. G. More were guilty of the most reprehensible practice of planting and sowing seeds of various non-indigenous plants there. See A. G. More's Supplement to the *Flora Vectensis*, Journ. Bot. 1871, 11, 19.

Euphorbia Peplis L. V. 2. St. Helen's Spit (Dr. B. Daydon Jackson, 1872). Not recorded since, I believe. Was this another plant of Bromfield's planting?

E. Paralias L. "Saltmead, a bay W. of Burnet Wood (1879)." Neither "Saltmead" nor "Burnet Wood" are known as places in the island. A single, very small, plant was found in Gurnard Bay in 1868, and there is no subsequent record. As I saw it growing in great profusion on the shore of Hayling Island in 1870, forming seed abundantly, and as it was observed there in 1849 by Dr. Bromfield, it would not seem unlikely that seeds might have drifted across to the shores of the island, but the sowing by Dr. Bromfield of seeds both at St. Helen's and Norton Spit (in both of which localities it has flourished for many years) leaves the matter doubtful.

E. platyphyllos L. IV. 3. Alverstone Whippingham. V. 2. Steephill. "Newbridge; Tate (Baker)" is in District IV. 2, not V. 2.

Mercurialis annua L. IV. 3. Newport.

Ceratophyllum demersum L. IV. 3. Pond, Heytesbury Farm, near Newport.

Typha angustifolia L. This species increases and seems to take the place of *T. latifolia*; and where the two grow together, the slender species appears to drive out the robuster.

Sparganium neglectum Beeby. V. 2. Near Landguard, Shanklin.

Arum italicum Miller. This plant is still abundant in the undercliff from Ventnor to Niton. The leaves appear towards the end of September, the flower about the beginning of June, the fully-ripe fruit in October, and the young seedlings in February. I am not sure that I have not seen plants with white-veined leaves, but certainly not often. In Jersey in April, 1871, Dr. Trimen and I collected plants with white-veined leaves.

Lemna polyrrhiza L. The Sandown locality is in District V. 2, not IV.

Zannichellia palustris L. V. 1. The locality is "Mottistone Mill," not "Mottisfont."

Hydrocharis Morsus-ranæ L. IV. 1. Pool on a small heath between Freshwater Farm and Norton.

Elodea canadensis Michx. Stated in Mr. A. G. More's Supplement to have been planted in a pond near the Spencer Road, Ryde, before 1850. In 1860 it was found at Barton, near Osborne, and by 1864 it was abundant everywhere in the island; another instance of the rapid dispersion of the plant. By 1880 it had ceased to be the prevailing plant in the ponds and mill-streams in the neighbourhood of Newport, but in 1908 it seemed to be making some progress again, which up to the present time it has not maintained.

Aceras anthropophora R. Br. V. 2. Shanklin Down.

Orchis pyramidalis L. IV. 3. Pan Down. IV. 4. Arreton Down.

O. ustulata L. V. 1. Shorwell.

O. latifolia L. IV. 3. Clatterford Pan, near Newport.

Gymnadenia conopsea R. Br. IV. 3. Carisbrooke Castle; Pan Down.

Ophrys apifera Huds. and *O. muscifera* Huds. Both are becoming much more scarce with us, greatly due, I believe, to the so-called "nature study" now very popular in our schools. It is very desirable that a horror of collecting numbers of specimens of rare plants should be instilled in the minds of children and others.

Neottia Nidus-avis Rich. V. 2. Fremantle Wood, near Godshill.

Epipactis latifolia All. (*helleborine* Hill). IV. 3. Alverstone Whippingham.

Cephalanthera grandiflora Gray. IV. 2. Westover. IV. 3. Carisbrooke Castle. V. 2. St. Lawrence.

Colchicum autumnale L. IV. 3. This plant has for at least fifteen years grown freely and without cultivation in the grassy borders of the garden of Blackwater House. The locality agrees fairly with that mentioned by Bromfield, "a field by the Medina above Shide Bridge," in which the plant was found many years ago. I do not know if it was ever planted at Blackwater.

Cyperus longus L. The brave struggle for existence which this plant makes in its station at Apes Down was noted in this Journal for 1910 (p. 142).

Cladium Mariscus R. Br. I have never been able to find this plant in its only island locality. If it still exists "in the bog at Easton Freshwater Gate" it, as well as all the bog plants still growing there are threatened by proposed conversion of the marsh into a "pleasure garden"!

Eriophorum latifolium Hoppe. IV. 1. There is, alas! now no "boggy part of Colwell Heath," and this plant must, I fear, be considered extinct.

Carex Bœnninghausiana Weihe. V. 2. Parsonage Lynch, July, 1872.

Spartina Townsendi H. & J. Groves. IV. 3. This plant is taking the place of *S. stricta* in the creeks on the east side of the Medina below Newport. In 1867 there was only *S. stricta* to be found in these creeks and, I believe, elsewhere in the island. Now it is difficult to find *S. stricta.*

Alopecurus bulbosus Gouan. V. 1. Yarmouth.

Agrostis pumila L. IV. 3. St. George's Down.

Catabrosa aquatica Beauv. IV. 3. Clatterford, Carisbrooke.

Glyceria aquatica Wahl. No longer to be found in the only known station in the island—Colwell Bay. I last saw it there in 1886.

Poa compressa L. IV. 3. Shide.

Festuca Myuros L. V. 2. Knighton.

Asplenium Ruta-muraria L. IV. 3. Carisbrooke Castle. V. 2. Gatcliffe, near Godshill.

Osmunda regalis L. IV. 3. Extinct, I fear, in the Wilderness. Though in 1870 I walked through thickets of it five or six feet high, I have not been able to find a single plant in late years. This is due to the rapacity of fern dealers, and the folly of fern buyers.

Botrychium Lunaria Sw. V. 2. Meadow north of Cook's Castle, near Wroxall.

THE LARDIZABALACEÆ OF JAPAN.

By Seiitchi Narita.

(Of the Tokyo Botanical Society.)

Conspectus of Genera.

Sepals 6; petals 0	Stauntonia Decne.
Sepals 3; petals 0	Akebia Decne.

Stauntonia Decne.

S. hexaphylla Decne. Ito et Matsum. Tent. Flor. Lutc. i. p. 289; Palibin, Conspec. Floræ Koreæ, i. p. 21; Matsum. et Hayat., Enum. Pl. Formos. p. 17; Nakai, Flor. Kor. i. p. 40; Matsum. Ind. Pl. Jap. iii. p. 127.

Hab. Nippon (Mainland); Kiusiu; Liukiu (Lutchu); Formosa.

AKEBIA Decne.

1. Leaves 5-foliolate 2
   Leaves 3-foliolate 4
2. Male flowers numerous (25–30) in a raceme; inflorescence very elongate; sepals (of male flowers) 3 mm. long *A. longeracemosa* Matsum.
   Male flowers rather few (3–5) in a short raceme; sepals (of male flowers) 4·5 mm. long 3
3. Leaflets entire on the margin, subequal in size but not very variable .... *A. quinata* Decne.
   Leaflets often undulate or undulate-dentate on the margin, very variable in size ...... *A. lobata* Decne. var. *pentaphylla* Mak.
4. Leaflets ovate or oval, entire or loosely dentate on the margin *A. lobata* Decne.
   Terminal leaflets lanceolate, obtuse at the tips, truncate at the base; lateral ones slightly smaller than the terminal ones, entire on the margin (also on the margin of the terminal ones), petiolules shorter than those of the terminal ones .... *A. sp.* Hayat.

A. LOBATA Decne. Matsum. Ind. Pl. Jap. iii. p. 128.
Syn. *A. clematifolia* S. et Z.; *A. quercifolia* S. et Z.
Hab. Yezo; Nippon; Kiusiu.

Var. PENTAPHYLLA Mak. in Bot. Mag. Tokyo.
Hab. Nippon; Shikoku.

A. LONGERACEMOSA Matsum. Matsum. et Hayat., Enum. Pl. Formos. p. 17; Matsum. Ind. Pl. Jap. iii. 127.
Hab. Formosa.

A. QUINATA Decne. Palibin, *l. c.* p. 21; Nakai, *l. c.* p. 40; Matsum. *l. c.* p. 127.
Hab. Nippon; Kiusiu.

A. sp. Hayat. Flor. Mont. Formos. p. 40.
Hab. Formosa.

RYNCHOSPORA FUSCA R. & S. IN BRITAIN.

BY ARTHUR BENNETT, A.L.S.

THE distribution of *Rynchospora fusca* in the British Isles is peculiar and difficult to account for. In Scotland, in the west, it occurs in *Inverness* (Watson's Westerness), but geographically also in Argyll; *i. e.* on boggy sides of a lagoon on Loch Sheil near the mouth of the River Pollock; also on the sides of two small lochs (alt. 180 ft.) near Salen, but in different watersheds; on Kentra Moss, Ardnamurchan, in great abundance over an extent of about three miles by a mile and a half. Over all it extends about nine miles by two miles. It can be easily recognized a hundred yards away by the dense brownish-yellow patches (S. M. Macvicar, *in litt.*). This is the extreme north of Argyll, in about 56° 46′ N. lat. Mr. C. E. Salmon found it in another station, "By Lochan

Dubh, Tor an Tairbert, near Loch Eil (v.-c. 97) in 1902." This is about six miles further inland than Mr. Macvicar's stations.

Going south from this, the following stations may be noted:—

73. *Kirkcudbright.* On Auchencairn Moor, J. McAndrew sp., 1882.

46. *Cardigan.* Dyfi estuary marshes, A. Ley in Record Club Rep. 1884–5–6 (1887), pp. 109, 148. Borth Bog, L. Cuming in Exchange Club Rep. for 1912 (1913), p. 292.

41. *Glamorgan.* "On Cromyln Bog, near Swansea," E. Forster, 1805, *Botanist's Guide*, p. 753. There is a specimen in Herb. Brit. Mus., but we have no recent record.

17. *Surrey.* Ponds near Elstead and Thursley, E. S. Marshall sp., 1882.

11. *Hants, South.* "I found this plentifully in a bog between Southampton and Limington in August," Petiver (1716), Conc. Gram. n. 149. Reeves sp., 1884.

8. *Wilts, South.* Landford Common, Tatum sp., 1892.

6. *Somerset.* Sole (1782) in MS. Flora. "Burtle Moor, near Mark," Clark in Proc. Somerset Arch. & Nat. Hist. Soc. 1856. Clarke sp., 1855.

The foregoing are the counties for which the records may be accepted. Besides these it has been reported for four others:—

2. *Cornwall, E.* "Recorded for the county by Ray in Syn. Meth. Stirp. 1690, and from 'within five miles of Trewhiddle' by Pascoe in Cat. Wats. [*i. e.* catalogue sent to Watson]. It was accepted for Cornwall by Watson in Cyb. Brit. iii. (1852), undoubtedly on the strength of Pascoe's Catalogue, drawn up two years earlier; but in Top. Bot. doubt is cast on its occurrence in the county," Davey, Fl. Cornwall, 471.

40. *Salop.* Leighton, Fl. Shrop. (1841), pp. 36, 508. We have no modern confirmation, yet the borders of the meres would seem to be a likely locality.

42. *Brecon.* Watson in Top. Bot. ed. 1 (1874), p. 421, who suggests that the record is erroneous.

62. *York, N.E.* "Bogs near Turington [Terrington], growing among the *S. albus*, rare," Teesdale in Bot. Guide (1805), p. 667 (entered with a mark of doubt). It may be that Teesdale mistook the var. *sordida* of *alba* for *fusca*. It is not noticed by Mr. Baker in N. Yorkshire, ed. 2 (1892), p. 390, and Watson (*l. c.*) suggests it was an error.

Even omitting the four last-named counties, the distribution of the plant is very peculiar, and suggests that careful search will detect it in other counties.

The first records for the British Isles are:—

England.—"Cyperus minor angustifolius palustris capitulis fuscis paleacis. In occidentalis Angliæ." Morison, Hist. Oxon. iii. 239 (1699).

Scotland.—A. Bennett in *Scottish Naturalist*, 1888, 257.

Ireland.—"Wet bogs near the bottom of Purple Mountain, Killarney," Mackay in Trans. Roy. Dublin Soc. v. (1806), p. 127.

In Europe it is generally distributed in Sweden (in fourteen provinces), extending north to Gefleborgs lån, and reappearing in Swedish Lapland. In Norway it extends up to 62° 35′ (Blytt). In Finland it occurs only in five of the botanical divisions in the south up to 62° N. lat. It occurs in France, Belgium, Holland, Denmark, Germany, Bohemia, Switzerland, Tyrol, Transylvania, Lombardy, Middle Russia, and in a few small States bordering on the military frontier of Austria.

NOTES ON TWO SELAGINELLAS.

By G. Hieronymus.

1. Selaginella Commersoniana Spring, Mon. ii. in Mém. Acad. Roy. de Belgique, xxiv. (1849), p. 110. Syn. *S. fissidentoides* Spring, *l. c.* p. 111, pro parte quoad specimen a cl. Pervillé in insula Mahé collectum; Baker, Handb. Fern All. p. 51, pro parte; non *Lycopodium fissidentoides* Hook. et Grev. Enum. Fil. n. 151, in Hook. Bot. Misc. *S. sechellarum* Baker, Fl. Maurit. 523, and Handb. Fern All. p. 52, n. 72 (ex fragmento speciminis authentici)

Distribution. The species is with certainty only known from the Seychelles Islands.

According to Spring the originals of *Selaginella Commersoniana*, collected by Commerson himself, came from the Philippines. This information Spring took from the label accompanying the type specimen in the Paris Museum. On the other hand, the label of another of Commerson's originals received by the Berlin Herbarium from Paris in 1820 has the note, "Côte de Coromandel," in Kunth's handwriting. Both statements seem to be wrong, the plant having probably been collected in the Seychelles Islands, although I have not been able to ascertain that Commerson visited those islands. However that may be, it is certain that Commerson's plant matches exactly specimens subsequently collected in the Seychelles Islands. Apart from Commerson's plant, the following specimens have to be referred to *S. Commersoniana*:—Mahé, Pervillé, no. 76 (1841, in Hb. Mus. Paris and Hb. Berol.-Dahlem); Mahé, Coll. ignot. (January or February, 1841; Hb. Link, Dahlem), originally labelled by Al. Braun "Selaginella sechellarum," but later on recognized by him as *S. Commersoniana*; Kersten, Von der Decken's Exped. (August, 1863); J. Horne, no. 157 (February, 1872), described by Baker as *S. sechellarum*; Barbarons, Mahé, distributed by the Botanic Station as no. 4 (May, 1910; Hb. Prince Roland Bonaparte, Paris); Mahé, Stanley Gardiner (1908; Hb. Kew); Silhoutte, Stanley Gardiner (1908, Hb. Kew), and H. C. Thomasset (Hb. Kew).

2. S. Willdenowii (Desv.), Baker in Gard. Chron. 1867, p. 950, and Handb. Fern All. p. 93. Syn. *Lycopodium lævigatum* Willd., Spec. Plant. v. p. 45 (1810), non Lam.; *L. Willdenowii* Desv. ap. Hook et Grev. Icones Fil. t. lvii.

Distribution. Indo-Malayan region, from Madras to the

Himalaya and Cochinchina, Malacca, Sumatra, Bangka, and Java; Seychelles Islands (Mahé, Victoria, J. Stanley Gardiner).

Spring's affirmation that the species also occurs in West Africa refers, as already suggested by Baker, to *S. scandens*, whilst his further statement that it is found in Brazil is probably based on cultivated specimens or escapes. The specimens collected by Bonpland in Equatorial America and preserved in the Paris Museum are not known to me, but it is practically certain that they do not belong to *S. Willdenowii*. Spring also enumerates the plant from the Philippines, quoting Cuming, no. 2417, but Cuming's specimen was from Singapore (see Rolfe in Journ. Linn. Soc. Bot. vol. xxi. 287), and the plant has not been found so far in the Philippines, notwithstanding the exhaustive researches of Merrill, Copeland, Elmer, and others. It is represented there by *S. Engleri* Hieron. and *S. Whitfordii* Hieron. Nor do the specimens collected by Naumann in MacCluer Bay, New Guinea, in 1875, and named *S. Willdenowii* by Al. Braun, belong to that species; they are rather referable to a closely allied form which, according to a communication by Capt. Van Alderwevelt von Rosenburgh, is identical with specimens collected by Treub near Skru, and by Teijsmann near Doreh, New Guinea. This form he calls *S. muricata* Cesati, var. *inermis* v. A. v. R. msc. *S. Willdenowii* has therefore to be struck off the list of New Guinea plants.

REPORTS OF DEPT. OF BOTANY, BRITISH MUSEUM, 1908–12.

By A. B. Rendle, D.Sc., F.R.S.

[Until the Editor left the Department of Botany in 1908, the Reports of the Department relating to the annual acquisitions had regularly appeared in this Journal. By some oversight this was discontinued, and it was only comparatively lately that attention was called to the omission. The Reports, which are included in the Annual Return of the British Museum, are published by H.M. Stationery Office, and may be purchased through any bookseller, but it has been found convenient to refer to the abstracts given in the Journal by various authors—*e. g.* the information as to the more recent Museum collections given in Alphonse De Candolle's *La Phytographie* is almost entirely drawn from these pages. We therefore propose to supply the missing Reports, which will we hope be completed by the end of the present year. It will be observed that with the Report for 1911 a new and more convenient arrangement has been introduced.—Ed. Journ. Bot.]

Acquisitions, 1908.

The following additions have been made to the collections by presentation:—396 phanerogams from Uganda, from Dr A. G. Bagshawe; 245 phanerogams and 30 cryptogams from Rhodesia, from F. Eyles; 126 specimens from Uganda, from Mrs Sybil M. Tufnell; 38 specimens from the Soudan, from the Director of

Woods and Forests, Kartoum; 200 specimens from Gazaland, from C. F. M. Swynnerton; 50 specimens of *Umbelliferæ* and *Compositæ*, and 43 monocotyledons from Algeria, from M. A. Joly Elbahy; 48 specimens from South Africa, from Rev. F. A. Rogers; 23 specimens from Lake Kivu, Central Africa, from Dr. Wollaston; 10 specimens from Uganda, from E. Brown; 10 specimens from Fayoum, from Dr. W. A. Cunnington; 5 specimens from South Africa, from Dr. H. Bolus; 14 specimens of *Podostemaceæ* from India, from J. C. Willis; 4 specimens from Garhwal, from Dr. T. G. Longstaff; 2 specimens of *Wissadula* from Brazil, from R. Fries; 50 specimens of plants from West Australia, collected by W. V. Fitzgerald, from F. S. Brockman; 4 specimens of *Eremophila*, &c., from Australia, from Prof. A. J. Ewart; 390 specimens from Chili, Brazil, and the Falkland Islands, from R. Morton Middleton; 2 specimens of orchids from Jamaica, from W. Fawcett; 3 specimens of *Ophrys* from Hyères, from H. S. Thompson; 2 specimens of flowering plants from Rev. W. Moyle Rogers; 3 specimens of cultivated plants from Hon. Walter Rothschild; specimens of fossil seeds of *Najas marina* and *N. minor* from Clement Reid; 2 fruits of *Martynia* from A. E. Stearns; 3 specimens of cultivated orchids from Sir Trevor Lawrence; 4 specimens of cultivated orchids from J. O'Brien; 2 specimens of *Silene* from W. B. Paulson; specimens of *Alsophila* from Fiji, from Miss M. Benson; specimens of a tropical moss, *Calymperes*, recently discovered in Europe, near the fumaroles of Pantellaria, from Dr. Emilio Levier; 2 species of *Halimeda* and 3 specimens of *Avrainvillea* from the Paumotu Archipelago, from M. P. Hariot; some large specimens of *Laminariaceæ* from the Eastern Telegraph Company's cable near Gibraltar, from V. K. Cornish; a Japanese species of *Ecklonia*, from Prof. F. O. Bower; 11 species representing 4 genera of Lithothamnia from the Indian Ocean, collected during the 'Sea-lark' Expedition, from J. Stanley Gardiner; specimens of *Cladocephalus*, a new genus of Algæ from the West Indies, from Marshall A. Howe; 161 *Characeæ* from the herbarium of T. F. Allen, from the New York Botanical Garden.

The additions to the British Herbarium by presentation have been:—3 specimens from Dr. C. C. Vigurs; 229 specimens from Rev. E. S. Marshall; 72 specimens from Rev. H. J. Riddelsdell; 2 specimens from John D. Young; 4 specimens from A. B. Jackson; 3 specimens of introduced plants from W. B. Allen; 7 specimens from Clement Reid; 2 specimens from W. Whitehead; 10 specimens of Rubi, &c., from Prof. D. Oliver; 4 specimens from James Groves; 10 rare British *Hepaticæ* from Symers M. Macvicar.

Among the acquisitions by presentation special reference may be made to the collection of Diatoms formed by the late Thomas Glazebrook Rylands, of Warrington, and presented by his daughter, Miss Martha G. Rylands. It consists of about 6000 microscope-slides in cabinets, and includes the collection of the late Dr. Christopher Johnson, of Lancaster, bequeathed to Mr. Rylands. It was formed more than forty years ago, when great activity was manifested in the study of *Diatomaceæ*; and the two most active students of the group, Prof. G. Walker Arnott and Prof. R. K. Greville, and their more important correspondents are represented by numerous letters included in the collection.

The following additions have been made by exchange of duplicates:—1100 specimens from Brazil, Central Asia, Russia, &c., from the Director, Royal Botanic Gardens, St. Petersburg; 494 phanerogams and 12 cryptogams from Singapore, Siam, &c., from the Director of the Botanic Gardens, Singapore; 37 specimens of *Coprosma* from New Zealand, from J. F. Cheeseman; 308 specimens from South Africa, collected by R. Schlechter, from the Director of the Botanic Museum, Zurich; 395 specimens from Tibet and 94 specimens from Tropical Africa, from the Director, Royal Gardens, Kew; 56 specimens from Jamaica, from the Director of the New York Botanic Garden; 138 specimens from Australia, from the Director of the Botanic Garden, Sydney; 626 specimens from Texas, collected by Lindheimer, from the Director of the Missouri Botanic Garden; 56 specimens from Java, from the Director of the Buitenzorg Botanic Garden; 100 Kryptogamæ Exsiccatæ, from the Hofmuseum, Vienna; 13 specimens of West Australian orchids, from Oswald Sargent, York, West Australia.

The principal purchases during the year were:—200 specimens "Flora Stiriaca Exsiccata" (fasc. 7–10), from Hayek; 273 specimens "Plantæ Paraguarienses," from Dr. Hassler; 227 specimens from South Bolivia, collected by Fiebrig, from Dr. R. Pilger; 200 specimens of Dörfler's Herb. Normale, Cent. 47 and 48, from Dulau & Co.; 370 phanerogams and 82 cryptogams from New Caledonia, collected by R. Schlechter, from Dr. Loesener; 109 phanerogams and 6 cryptogams from Tucuman, Argentina, collected by Dr. L. Dinelli, from W. F. H. Rosenberg; 980 phanerogams and 107 cryptogams from Japan, from Rev. U. Faurie; 299 phanerogams and 10 cryptogams from Mexico, from C. G. Pringle; 62 specimens "Gramineæ Exsiccatæ" (fasc. xxi. xxii.), and 40 specimens *Cyperaceæ* (fasc. vi.), from Kneucker; 179 specimens from Cameroons, collected by Zenker, from Dr. E. Gilg; 440 specimens, including 31 vascular cryptogams from Mexico, collected by Dr. Purpus, from Dr. T. S. Brandegee; 50 specimens "Salicetum Exsiccatum" (fasc. vii.), collected by Toepffer, from Dulau & Co.; 20 phanerogams and 20 cryptogams from West Indies, from W. E. Broadway; 50 specimens "Batotheca Europæa" (fasc. v.), from H. Sudre; 176 phanerogams and 23 cryptogams from Lydia and Caria, and 40 phanerogams and 50 cryptogams from North Persia, and 52 specimens from West Persia, collected by Dr. Strauss, from J. Bornmüller; 59 phanerogams and 1 cryptogam from Transkei, South Africa, from Miss A. Pegler; 200 North American fungi, from Bartholomew; 200 German fungi, from Sydow; 100 *Uredineæ* and 25 *Ustilagineæ*, from Sydow; 100 fungi imperfecti, from Kabát and Bubák; 75 ascomycetous fungi, from Rehm; 150 Westphalian fungi, from Brinkmann; 50 fungi selecti, from Jaap; 100 micro-fungi, from Vestergren; 53 British micro-fungi, and 36 microscope preparations, from Miss A. L. Smith; 40 lichens of North England, from Rev. W. Johnson; 813 Bavarian lichens, from Britzelmayr; 20 rare European lichens, from Zahlbruckner; 1214 coloured drawings of lichens, prepared by the late Dr. R. Deakin and illustrating his lichen herbarium, which was presented to the Department in 1889, from Hutchinson; 76 marine algæ of South Australia, from Mrs. Harold; 100 North American algæ from Collins, Holden, and Setchell; 40 microscope preparations of diatoms and 105 of fresh-water algæ and *Peridinieæ* from material collected by Dr. W. A. Cunnington in the East African Lakes, from West; 1007 microscope preparations of British mosses, from Sherrin; 50 mosses of Malay Archipelago, from Fleischer; 20 North American *Hepaticæ*, from Haynes; 424 mosses and hepatics of India, 74 of Japanese islands, 143 of British New Guinea, 50 of Tasmania, 132 of Guatemala, from Levier; 59 mosses of France, from Husnot; 100 mosses of South Europe, from Fleischer and Warnstorf; 125 cryptogams of Germany, Austria, and Switzerland, from Migula; 116 coloured drawings of Scottish cryptogams by Greville, from Parritt.

Among the acquisitions by purchase special mention should be made of the collection of marine algæ made by the late E. A. L. Batters, consisting of more than 10,000 British and 3000 foreign specimens, and more than 3000 microscope preparations. The slides add much to the facilities for studying the algæ, and the whole collection affords a good representation of the work done in recent years towards ascertaining the distribution of the species around the coasts of the British Islands.

ACQUISITIONS, 1909.

The following additions have been made to the collections by presentation:—The herbarium of the late Rev. R. P. Murray, from Mrs. R. P. Murray; 12 specimens of seeds from Sikkim, from Capt. Gage; 22 phanerogams from New Guinea, from Capt. F. R. Barton; 138 phanerogams from the Curator of the Sarawak Museum; 54 phanerogams from the neighbourhood of Shanghai, from F. W. Styan; 78 phanerogams and 15 cryptogams from Fiji, from Miss L. Gibbs; 24 phanerogams from West Australia, from O. H. Sargent; 9 specimens of Australian woods from Millar's Karri and Jarrah Co.; 32 phanerogams and 4 ferns from South Nigeria, from A. E. Kitson; 114 phanerogams and 1 cryptogam from Nigeria, from C. C. Yates; 27 phanerogams from Uganda, from E. Brown; 118 specimens from Rhodesia, from E. C. Chubb; 43 phanerogams from Rhodesia, from Dr. R. F. Rand; 8 specimens of fruits from West Indies, from A. E. Aspinall; 390 specimens from Chili, from R. M. Middleton; 40 phanerogams from Patagonia, from Dr. P. Dusén; 9 specimens of cultivated plants from Walter Ledger; 73 ferns of New Zealand and 100 ferns of tropical Asia, from Llewellyn Lewis; 7 growth-forms of *Asplenium Bradleyi*, from Tennessee, from R. M. Middleton; 227 algæ of Barbados, from the executors of the late Miss

Anna Vickers; 48 tubes of plankton collected in the African Lakes, by Dr. W. A. Cunnington, from the Tanganyika Committee; 33 marine algæ of the Danish West Indies, from Dr. F. Börgesen; 26 Australian lichens, from Edwin Cheel; 23 mycetozoa from the Philippine Islands, from E. D. Merrill.

The additions to the British Herbarium by presentation have been:—The British Herbarium of the late John Benbow, of Uxbridge, from A. J. Benbow; 35 specimens from C. E. Salmon; 17 specimens from Rev. E. F. Linton; 205 specimens from Rev. E. S. Marshall; 15 specimens from W. H. Beeby; 5 specimens from Rev. H. J. Riddelsdell; 74 specimens of rubi from Rev. W. Moyle Rogers; 30 specimens of potamogetons from A. Bennett; 3 specimens from W. P. Hiern; 2 specimens of diseases of cultivated trees, by W. Gamble; 2 rare British marine algæ, by A. D. Cotton; 2 fungal diseases of insects, by E. R. Bankes; microscope preparations from a Scottish glacial peat deposit, by H. N. Dixon.

The following additions have been made by exchange of duplicates:—265 phanerogams and 28 ferns from Malaya, from the Director of the Botanic Gardens, Singapore; 139 phanerogams and 6 cryptogams from South Africa, collected by R. Schlechter, from the Director of the Botanic Museum, Zurich; 78 phanerogams from South Africa, from Dr. H. Bolus, Cape Town; 18 specimens West Australian orchids, from Oswald Sargent, West Australia; 250 ferns from the West Indies and Mexico, from the U.S. National Herbarium, Washington; 74 phanerogams, chiefly from the West Indies and Venezuela, from the Director of the Botanic Museum, Copenhagen; 341 phanerogams and 119 cryptogams from the Director of the Museu Goeldi, Para, Brazil; and 200 cryptogams from the Hofmuseum, Vienna.

The principal purchases during the year were:—990 phanerogams and 16 cryptogams from Hungary, Bosnia, &c., from C. K. Schneider; 194 phanerogams and 6 vascular cryptogams, "Flora Stiriaca exsiccata," fasc. 11–14, from Hayek; 50 specimens "Salicetum exsiccatum," fasc. iii., from Toepffer; 50 specimens "Batotheca Europæa," fasc. vi., from Sudre; 603 phanerogams and 102 cryptogams from Japan and Korea, from Rev. U. Faurie; 319 phanerogams and 117 cryptogams from China, from Father Hugh; 50 phanerogams and 5 vascular cryptogams from Java, from Buysman; 264 phanerogams and 9 vascular cryptogams from N.W. Rhodesia, from Theo. Kässner; 128 specimens from German East Africa, from W. Büsse; 84 phanerogams from German East Africa, from Scheffler; 362 specimens from Cameroons, from Zenker; 2807 phanerogams and 37 cryptogams from Angola, from John Gossweiler; 470 phanerogams and 6 vascular cryptogams from Montana, from J. W. Blankinship; 55 phanerogams and 2 *Equisetaceæ* from Washington, from W. N. Suksdorf; 49 phanerogams and 75 cryptogams from Costa Rica, from Tonduz; 159 phanerogams and 3 cryptogams from South Bolivia, from Fiebrig; 284 phanerogams and 25 cryptogams from Brazil, from P. Dusén; 337 phanerogams and 39 cryptogams from New

Caledonia, from R. Schlechter; 60 specimens "Gramineæ," Lief. xxiii.–xxiv., from Kneucker; 902 microphotographs of woods illustrating minute structure, from J. A. Weale, and single specimens from C. C. Tatham and Mrs. Brittan; 218 cryptogams of the Ionian island of Leucadia, from Mrs. Baden Powell; 90 Pteridophytes of South America, &c., from Rosenstock and Schroeder; 34 *Muscineæ* from South Africa and Siam, from Wilms and Hosseus; 60 Musci Americæ Septentrionalis, from Renauld and Cardot; 138 Canadian mosses, from Macoun; 50 mosses of the Indian and Polynesian Archipelago, from Fleischer; 464 mosses and hepatics of Sikkim, Guatemala and Mexico, from Levier; 20 American *Hepaticæ*, from Haynes; 50 Hepaticæ Europææ, from Schiffner; 150 North American marine algæ, from Collins, Holden and Setchell; 50 fungi selecti and 40 myxomycetes, from Jaap; 50 fungi imperfecti, from Kabát and Bubák; 200 fungi columbiani, from Bartholomew; 50 ascomycetes, from Rehm; 100 micromycetes rariores selecti, from Vestergren; 50 *Uredineæ*, 25 *Ustilagineæ* and 100 German fungi, from Sydow; 50 Westphalian fungi, from Brinkmann: 16 prepared British fungi, from Hartley Smith; 66 new or rare British fungi and 46 microscope preparations, from Miss A. Lorrain Smith; 100 Russian lichens from Elenkin.

(To be continued.)

INTERNATIONAL BOTANICAL CONGRESS, London, 1915.

In connection with the forthcoming Congress, the following circular has been issued: "The International Botanical Congress, held at Brussels in May 1910, decided, on the invitation of the Royal Society of London, that the next Meeting of the Congress, in 1915, should be held in London. At a representative meeting of British Botanists, held in London on May 10, 1911, a provisional Bureau was nominated, consisting of three Presidents (Prof. F. O. Bower, Sir David Prain, and Prof. A. C. Seward) and a General Secretary (Dr. A. B. Rendle). The Bureau was empowered to co-operate with the permanent Bureau of the Brussels Congress and to arrange for the appointment, in consultation with the British Botanists, of an Organizing Committee. This Organizing Committee was elected at a General Meeting of British Botanists held in London on March 11, 1912; and at a Second Meeting, held on May 17, an Executive Committee was appointed. A number of distinguished patrons of botany were also invited to lend their support to the Congress. The following general regulations for the conduct of the Congress have been approved by the Executive Committee:—1. The Fourth International Botanical Congress shall be held in London from Saturday, May 22, to Saturday, May 29. 2. Membership of the Congress shall be conditional upon subscribing to its regulations and the payment of a subscription of fifteen shillings. Members will receive all the publications of the Congress. Ladies accompanying members may attend the meetings and excursions of the Congress on payment of ten shillings each. 3. The work of the Congress shall include the different branches of Botanical Science; and the Congress will also carry on the work on (1) Nomenclature, and (2) Bibliography and Documentation, left over from the previous Meeting. The permanent Bureaus entrusted with the work concerned with (1) Nomenclature, and (2) Bibliography and Documentation will act in conjunction with the Executive Committee. 4. Any language may be used in the discussions; if desired by the Members, propositions shall be translated forthwith into English, French, and German. English shall be the official language of the Congress. Particulars of meetings, discussions, excursions, &c., will be issued later." The organizing committee is composed of the Presidents already named and of the following Vice-Presidents: Prof. I. Bayley Balfour, W. Bateson, Esq., Dr. F. F. Blackman, Sir Francis Darwin, Prof. H. H. Dixon, G. Claridge Druce, Esq., Prof. J. B. Farmer, A. D. Hall, Esq., Dr. W. B. Hemsley, Dr. R. Kidston, Prof. F. W. Oliver, R. L. Praeger, Esq., Miss E. Sargant, Dr. D. H. Scott, A. G. Tansley, Esq., Prof. S. H. Vines, H. W. T. Wager, Esq. The long list of members fully represents British Botany. The *Executive Committee* consists of the Presidents, Treasurer, and Secretaries, together with Prof. J. B. Farmer, Mr. A. W. Hill, Prof. F. Keeble, Prof. F. W. Oliver, Mr. A. G. Tansley, and Miss E. N. Thomas. Sir Frank Crisp and Dr. Stapf are respectively Treasurer and Foreign Secretary.

To meet the various expenses connected with the Congress it is estimated that a sum of at least £1000 will be required; and in order to provide this sum the Committee are asking for contributions from those interested in Botany in the British Isles.

ADOLPHUS HENRY KENT.

(1828–1913.)

A LIFE of strenuous industry in the face of considerable physiological disadvantages was that which has just come to its close in the death of Adolphus Henry Kent. He was born, I believe, in my own native village, Bletchingley, Surrey, in 1828, where his father was Vestry Clerk and village schoolmaster. With pale sandy hair that early became white, extremely short-sighted, and almost stone deaf, he was severely handicapped in life's race. I first remember him—about fifty-five years ago, when he was acting as his father's assistant, as my father's friendly rival in the budding and cultivation of roses. He taught me the rudiments of Latin grammar before I went to school, and I well remember how when I had declined *Musa* he asked me when I was going to begin. He taught himself French and some German, so as to graduate as B.A. in the University of London;

but, when his father died, it was obvious to all that, with his afflictions, it was impossible that he could carry on a boys' school. It was a happy thought of the late Sir George Macleay to introduce Kent to Messrs. Veitch, and some years later I remember Sir Harry Veitch—as he now is—saying to me before Kent, though not in his hearing, that it was a happy day both for Kent and for the firm when they met. In spite of his deafness he was able to conduct the foreign correspondence, and then carried out two important botanical works for his employers. In 1881 appeared the first edition of the *Manual of the Coniferæ*, of which a thoroughly revised version appeared in 1900; and in 1887–94, the larger undertaking, the *Manual of the Orchidaceæ*, in two volumes. Both are exceptionally good specimens of botanical work adapted for horticultural purposes; and it must be remembered that Kent was practically a self-taught botanist. In 1887 Sir Harry Veitch and I had the pleasure of proposing him for election as an Associate of the Linnean Society, a well-earned honour; but his work was so completely identified with that of the great Chelsea firm of horticulturists, that there seems something singularly appropriate in the appearance of the announcement of the close of his earthly labours almost simultaneously with that of the dissolution of a business which has become historic in gardening annals.

In Chelsea Kent did much useful parochial work, in the course of which he found a wife; but we are here concerned only with his conscientious work for horticultural botany. With advancing years his visits to the Natural History Museum became rare, and he was for some years obviously failing in strength. He died at Fulham on September 12th, in the eighty-sixth year of his age, and some thirty-five years after his first entering the service of Messrs. Veitch.

G. S. Boulger.

SHORT NOTES.

Senecio sarracenicus L.—In my small stock of dried British material there are two very distinct plants under this name, both of which appear to have been included by Linnæus in his species; but I do not yet know which of them is represented in his herbarium. The first occurs plentifully by small streams, sometimes in company with our native form of *Aconitum Napellus*, and looking equally wild, in several parts of Somerset. It agrees very well indeed with De Candolle's description (*Prodromus*, vi. 353) of *S. sarracenicus* Jacq., of which *S. fluviatilis* Wallr. and *S. salicetorum* Godr. (see White's *Bristol Flora*, p. 382) seem to be synonyms. This is large (up to five feet) and strong; stem-leaves more or less amplexicaul, broad (the lower sometimes an inch and a half), strongly and rather coarsely serrate, with a short point; phyllaries many (12–15); heads often very numerous, with eight ray-florets; pappus at length exceeding the disc-florets. The second appears to be *S. Fuchsii* Gmel. *Fl. Bad.* iii. 444, as described in the *Prodromus* (*l. c.*). My examples are from a roadside near Colonsay House, Colonsay, N. Ebudes (*W. F. Miller*, Aug. 3rd, 1886), and from a roadside, Leggygowan, Saintsfield, Co. Down, Ireland (*C. H. Waddell*, July 16th, 1905), noted as "probably an escape, but has grown here for many years." It seems to bloom considerably earlier, and is much more slender. The stem-leaves are a good deal narrower (an inch across at most), linear-lanceolate, gradually narrowed to the base and the long apex, very finely (in some cases almost imperceptibly) serrate; heads fewer and smaller, with fewer phyllaries, and ray-florets not exceeding six in number; pappus falling short of the disc-florets. *S. Fuchsii* is said by De Candolle and Rouy to grow in hilly woods, and occurs as far west as Belgium and France. No doubt it was introduced into the two stations mentioned above, but there is a possibility of its occurrence in this country under less suspicious circumstances.—EDWARD S. MARSHALL.

ALCHEMILLA CONJUNCTA Bab.—This was left out of the *London Catalogue*, ed 10; I believe, on the recommendation of the Rev. E. F. Linton, who agreed with M. Buser that its real occurrence in Britain was very questionable. Mr. Druce retains it in his *List of British Plants* (as *A. argentea* G. Don = *? alpina* × *vulgaris*), with a query after the vice-comital census number. Syme (*English Botany*, ed. 3, p. 139) doubted its being wild in Britain; but Babington (*Manual*, ed. 8, 1881, p. 103) marks it as having been seen by him from Clova and from Glen Sannox, Arran. This year I made the acquaintance of Mr. H. Slater, now living at Stawell, near Bridgwater, who informed me that he, in company with his parents, had found it sparingly in Glen Sannox, between 1870 and 1880, and had grown it ever since. He very kindly sent me a living plant, which is, clearly, the right thing. My only herbarium specimen is a cultivated one from Mr. Bennett. Mr. Beeby sent me the following note on it:—"The root is from Cumberland, p. [per ?] Rev. R. Wood (v. Bot. Exch. Club Report, 1881). Conf. *Annals Scott. Nat. Hist.* 1906, p. 121." I have grown both this and *A. alpina* L. for several years; the latter does not spread by seeding in the garden, whereas *A. conjuncta* reproduces itself rather freely, and keeps quite true. I see no trace of *A. vulgaris* whatever. Apparently, therefore, the omission from Lond. Cat. was quite premature.—EDWARD S. MARSHALL.

NEPETA GLECHOMA var. PARVIFLORA Benth. (p. 253).—At the end of her very interesting paper Miss Armitage asks why this was omitted from the tenth edition of the *London Catalogue*. Many years ago I consulted Mr. Beeby about it; he answered that the species was trimorphic, and that he considered the variety to be not worth keeping up. I have since then occasionally come across plants which agreed with the description; to me also they did not seem to be more than a very slight variation. The

Merrow specimens found by Miss Armitage appear to come under *β hirsuta* Benth. in DC. *Prodromus*, xii. 391 (1848), as a form ("hirsutior est") with small, pale flowers; they do not fit *γ parviflora* Benth. ("omnibus partibus minor et glabrior"), for which he quoted as synonyms *G. heterophylla* Opiz! Reichb. *Fl. Germ. Exc.* p. 316, and *G. intermedia* Schrad.!; so that, as usual, his tendency was towards reducing rather than amplifying, and with more reason than in the case of some very distinct British species, such as *Epilobium lanceolatum* and *Carex depauperata*.—EDWARD S. MARSHALL.

HELLEBORINE VIRIDIFLORA IN BRITAIN.—We have ascertained that *Helleborine viridiflora* (*Epipactis viridiflora* Reichb.), which, we believe, has not hitherto been known as a British plant, occurs on the Lancashire coast. Mr. R. A. Rolfe, of Kew, has compared the Lancashire plant with authentic specimens of the species in question, and finds that they agree. We propose to give further particulars in a future number of this Journal.—J. A. WHELDON & W. G. TRAVIS.

MAIANTHEMUM BIFOLIUM Schmidt (pp. 202, 257).—Mr. Bennett contributes to the *Naturalist* for August some notes on Mr. Jackson's paper (pp. 202–207), from which we extract the following passages:—"Hunter mentions it as growing in a wood (Caen or Ken Wood) with *Convallaria majalis*, *C. verticillata* and *C. Polygonatum*. These two latter species would seem to me at once to suggest doubt as to the other being native there. While the same argument that Mr. Wheldon uses with the Yorkshire plant, 'that the plant does not occur in other woods,' may be used with the Caen Wood plant, why does it not occur in Bishop's Wood, or other woods near or at the north of Caen Wood? . . . So far as the Yorkshire station is concerned a note by Mr. J. Backhouse, Junior, may be quoted:—'It is growing in the utmost profusion among *Trientalis europæa*, *Vaccinium*, Luzulas, &c., on the slope of a steep brow covered with scattered trees. Suffice it to say that before knowing *where the plant was*, I decided where, *if it were a native*, it '*ought to be*.' This was determined partly by the general configuration of the country, and partly by the kind of vegetation clothing the district, and proved quite correct. Never in Norway did I see it more abundant or finer, that I remember. For a considerable distance the hillside is carpeted with it. It is not, however, the quantity merely, but as I said before the general circumstances and position of the locality which leave no doubt whatever on my mind of its being a genuine native' (*Phytologist*, p. 318, 1861). . . . All the rules of the old records seem to accept without any doubt the idea that Gerard's locality of 'Dingley Wood, six miles from Preston, in Aundernesse,' must be the Lancashire Preston as Gerard so gives it; but I would suggest it may have been Preston in Holderness, in the East Riding. . . ."

REVIEWS.

Twenty-eighth Annual Report of the Watson Botanical Exchange Club, 1911–1912. Vol. ii. No. 8. Cambridge: Printed by J. Webb & Co., Alexandra Street. 1913.

The above-named Report, which was issued in January of this year, should have been noticed earlier. The referees of the Club are the Revs. E. F. Linton, E. S. Marshall, W. Moyle Rogers, and Mr. C. E. Salmon, and the distribution this year has been undertaken by Mr. W. Barclay, of Perth. It speaks well for British botanists that they should be able to provide material for two annual publications such as this Report and that of the Botanical Exchange Club, as well as contributions to this Journal, and in neither do we indicate any flagging of interest.

A note by the distributor may well be reprinted here, as the caution is certainly needed with regard to critical species. The danger referred to is practically unavoidable in connection with distributed sets, even those most carefully prepared, and has undoubtedly led to confusion. The note runs:—"Mr. Moyle Rogers, as referee for the Brambles, and Dr. Drabble, the referee for the Pansies, wish that all the sheets representing a species should be sent to them for examination, not merely a single sheet representative of the others. Where this is not done, their decisions refer only to the sheets which they have seen, not to the others which they have not seen. With this demand I sympathize, as there is no doubt but that in these genera, and, I may add from my own experience, in the Roses also, mixtures sometimes occur. In the case of the Brambles and Pansies, for which Mr. Rogers and Dr. Drabble are practically the sole referees, the request can easily be complied with, but in the case of other genera, where there are generally several referees, the same thing can hardly be done, as it would certainly lead to considerable delay in the distribution, and very probably to some confusion in the specimens. I believe, however, that in the case of the Brambles the danger of admixture is greater than in any of the other genera."

Among the notes, those on Roses, by the distributor, hold an important place on account of the special attention he has paid to the genus, and the same may be said of the notes on *Hieracium*, by Messrs. Linton and Marshall, each of whom describes at length, but does not name, an Inverness-shire form which they believe to be new. Mints occupy five pages, and their identification gives rise to considerable discussion, in which Messrs. Bennett, Marshall, and Salmon take a prominent part: the specimens discussed are mostly from Cornwall, sent by Mr. F. H. Davey, who is the largest contributor for the year. Dr. Moss contributes notes on *Salicornia*; *Carex* has engaged the attention of Messrs. Bennett and Marshall, the latter of whom has notes on *Betula*. For the varied information given under these heads reference must be made to the Report itself, for which application should be made to the Honorary Secretary of the Club, Mr. George Goode, Lyndhurst, De Freville Avenue, Cambridge. We do not know whether the Reports are on sale; if so, it would be convenient if this were stated on the wrapper: the exact date of publication should also appear somewhere.

In accordance with our usual practice, departed from last year owing to exigency of space, we give a few extracts relating to individual species, which will, we think, interest our readers: in those on *Polygonum* of the *Avicularia* group Dr. Moss incidentally records a species new to the British Flora.

We note with interest that certain suggestions which we ventured to make when noticing the Report for 1909–10 (*Journ. Bot.* 1911, 68) have been adopted—we think (naturally) to the benefit of the Report.

Prunus domestica L. Undercliff, Portishead, N. Somerset, v.-c. 6, April 18 and July 1, 1911. This is an undoubtedly native locality for the wild plum. It occurs in abundance, which is unusual where there are no suspicious circumstances about the position.—Ida M. Roper. The characters of this specimen do not seem to fit our normal *P. domestica* at all well in some respects, so far as books go, though of course one ought to see the ripe fruit. My herbarium examples of *P. domestica* have a smooth and more or less shining bark, very unlike the dull, pubescent twigs of this Portishead plant.—E. S. M. The plum trees at Portishead have for many years been under observation by Mr. David Fry and myself, and the late Rev. Augustin Ley agreed with us that they afforded as good an illustration of native *P. domestica* as was likely to be met with. They are trees, are not spinous, the flowers and fruit are larger than those of the bullace, and the fruit is of a different shape. Still, Mr. Marshall's criticism is quite just, and it is to be feared that satisfactory typical specimens of the various forms in this aggregate must be rare. Without doubt there exists a long series of intermediates that connect our plum, bullace, and sloe as described in books. This is well shown by Rouy and Foucaud in their *Flore de France*, where sixty or seventy named segregates in this group are mentioned!—J. W. W[hite].

Erica cinerea L. forma. Carnon Croft, near Truro, W. Cornwall, v.-c. 1, Sept. 2, 1911. A striking form with long and densely flowered racemes. It was seen *in sitû* by members of the Phytogeographical Excursion, all of whom considered it deserving a name. I have seen it in other parts of the county, but nowhere so fine as at Carnon Croft, where it has the company of *E. ciliaris* and *E. ciliaris* × *Tetralix*.—F. H. Davey. A beautiful form with crowded whorls and much exserted styles, but I think only a form.—E. F. L. A very beautiful form, which, *if it keeps constant*, should deserve a distinguishing name.— C. E. S. This striking form is characteristic of the mild, moist districts of South-western England and Western Ireland. It is abundant, for example, in Connemara. In the drier Eastern England the form of *E. cinerea* is very insignificant compared with this, but I do not doubt that every possible intermediate could be found connecting the extremes.—C. E. M.

Lamium maculatum L. var. lævigatum L. Roadside, Leigh Woods, Bristol, N. Somerset, v.-c. 6, April 15, 1911. The type is rather frequent about Bristol, but this variety is decidedly rare.—Ida M. Roper. This may very possibly be a native; I have never heard of the unspotted plant being cultivated in Britain. It was the only one which I observed near Marburg, Hesse, in 1880. Rouy divides *L. maculatum* L. into three "races" (*Fl. de France*, xi. 298): *L. rugosum* Ait. (*L. maculatum* auct. mult., Smith, *English Botany*); *L. hirsutum* Lam.; and *L. rubrum* Wallr. (*L. lævigatum* All., L. *pro parte*), which is apparently Miss Roper's plant:—"Feuilles irrégulièrement incisées-dentées, ovales-cordées, à longueur égalant envers leur largeur à la base, acuminées; verticilles 6–10-flores; plante de 2–4 déc., à feuilles assez petites, ordinairement maculées de blanc ou de noir, rarement vertes." I grow the plant commonly called *L. maculatum*, and its leaves are always blotched with white. Koch (*Synopsis*, ed. ii. 649) says that *L. lævigatum* L. (*Sp. Plant.* 808), according to Bentham—who examined the Linnean Herbarium for this [*L. lævigatum* Reichb.] and *L. maculatum*—does not differ [from the type]; but so many of the Linnean specimens are badly dried and scrappy that I do not believe that his opinion carries much weight. The aggregate species is common in France, especially westwards, and occurs in Spain, Portugal, Belgium, Holland, &c.; so there is no *primâ facie* reason why it should not be indigenous in England.—E. S. M.

Polygonum ——, var. vel hybr. nov. ad Angl. Trodden cindery ground, Poole, Dorset, v.-c. 9, Oct. 5 and 9, 1911. Dr. Moss, who was with me when we found this little novelty, will shortly describe it. Having the small fruit of *P. microspermum* Jordan, it seemed to me at first allied to that plant. By the leaves and habit it is nearer *P. arenastrum*, with which it was associated.—E. F. Linton. A small form of Boreau's plant.—A. B. I think that this pretty little plant is rightly placed as a variety, or form, of *P. arenastrum*. I have two gatherings tending towards it, in their small fruit and foliage, though they are more luxuriant and less extreme, found near Hothfield, E. Kent, in September, 1891, and on the sandy coast near Dunster, S. Somerset (with *P. Raii* Bab.), in September, 1906.—E. S. M. The relationship of this plant to *P. calcatum* Lindman, *Bot. Notiser*, 139 (1904), has to be considered. Last September I found this species (new to the British Isles) on Arthur's Seat, near Edinburgh. It has a fruit which is sub-bifacial and not trigonous, and which has convex and not concave faces. Professor Lindman, after seeing my specimens, writes: "Your plant is indeed *P. calcatum*."—C. E. M.

Poa nemoralis L., var. Perranarworthal, W. Cornwall, v.-c. 1, June 6, 1911.—F. H. Davey. Rather weak type, I believe.—E. S. M. This does not seem to agree with any British variety in our books.—A. B. *P. nemoralis* L., var. *vulgaris* Gaud., forma *colorata.* This is not a published name, and tends only to state the fact that the spikelets of *P. nemoralis* var. *vulgaris*, which are pale green in shady places, become more or less coloured with violet, and often somewhat yellowish brown if the plant grows in sunny spots. All grades of intermediates exist between the two forms, mostly dependent on the degree of insolation. Another effect of the insolation is a more vigorous development of the spikelets, which are mostly 2-flowered in the shade, 3-flowered (or more) in the sun.—E. HACKEL.

PALESTINE PLANTS.

Die Pflanzen Palästinas auf Grund eigener Sammlung und der Flora Posts und Boissiers Verzeichniss. Von J. E. DINSMORE, mit Beigabe der arabischen Namen von Prof. Dr. G. DALMAN. 8vo, pp. 122. Leipzig: J. C. Heinrich. 1911.

The Jerusalem Catalogue of Palestine Plants. Third edition, revised. Compiled by the Botanical Department of the American Colony. Paper covers, 45 pp. Jerusalem: Vester & Co. 1911. Price 1*s*.

WE regret that we have omitted to notice the two useful catalogues above-named, which present in a convenient and cheap form a complete enumeration of Palestine plants. The former was published by the authors in the *Zeitschrift der Deutschen Palästrina-Vereins*, and contains the Arabic names in addition to the enumeration of the species; the latter, however, is the more complete, and its entire rearrangement and numerous additions make it practically a new book.

The Flora of Palestine is exceedingly rich, considering the small size of the country (about 10,000 sq. miles or 26,000 sq. km.), on account of the great variety of climate existing on its elevated hill-country, its low plains, and in the subtropical Jordan Valley. Four distinct zones of vegetation are found in Palestine: the maritime, the highland, the Jordan Valley, and the Desert on the east and south. The word "Palestine" is often used indefinitely, to cover a large portion of Syria, but in this catalogue it is restricted to the Bible definition "from Dan to Beersheba." With this definition the actual boundaries on the north are the Litany river and the foot of Hermon; on the east the Mecca Railway line (36th degree of east longitude) or the Syrian Desert; on the south, Wadi Ghuzzeh, from Gaza to Beersheba and thence to the south end of the Dead Sea; and on the west the Mediterranean Sea.

An attempt is here made to give a complete list of the native and naturalized plants found in Palestine, and to indicate their geographical distribution by letters and marks, which are explained in the preface. For this purpose the country is divided into eight districts:—

I. Central Palestine (Jerusalem district) which includes the highland district from Shechem (Nablus) to Hebron. The elevation on the west side is from 200 to 800 m., and on the east from 1 to 800 m.

II. The Plain of Sharon or Maritime Plain, including the lowland, except the sea coast from Mt. Carmel to Beersheba, with an elevation of 1 to 250 m.

III. Maritime or actual sea coast, 1 km. wide, from Tyre to Gaza, having an elevation of 1 to 15 m.

IV. Northern Palestine includes Samaria and Galilee from Nablus to the foot of Mt. Hermon and the Litany river, and is bounded on the east by that portion of the Jordan river above sea level, and on the west north of Mt. Carmel by the Maritime district. Its elevation is from 1 to 1200 m.

V. The Jordan Valley comprises the country below the level of the Mediterranean Sea from Lake Huleh to Jericho.

VI. Gilead and the Hauran is the district east of the Jordan between the Jabbok river and the foot of Mt. Hermon, with an elevation of 1 m. to 1300 m.

VII. Moab is the remainder of the East Jordan country, 1 m. to 1100 m.

VIII. The Dead Sea is the most interesting district of all, containing many strange and rare species, and including the land around the Dead Sea, from Jericho (Wadi Kelt) to the south end of the sea, with the valleys up to the level of the Mediterranean.

The total number of species (excluding varieties), as given in the Catalogue, is 2165, disposed in 735 genera and 120 families. New species are continually being discovered, and a supplemental leaf will be added to the Catalogue as occasion requires.

A careful selection of the most useful synonyms is given, especially of those given in other lists of Palestine plants but not found in the *Flora Orientalis* of Boissier. Since, however, this is indisputably the standard work for the botany of South-western Asia, the arrangement of species follows the order of that work, but the families and subfamilies are arranged according to Engler's *Syllabus*, sixth edition.

For this summary of the plan of the list we are mainly indebted to a type-written Bulletin issued by the Botanical Department of the American Colony in Jerusalem. The Catalogue cannot fail to be of interest for comparative purposes, and its low price brings it within the reach of all.

The Living Plant: a Description and Interpretation of its Functions and Structure. By W. F. Ganong, Ph.D., Professor of Botany in Smith College. 8vo, pp. xii. 478, tt. 178. London: Constable. 1913. Price 15*s*. net.

Dr. Ganong's book is not designed as a digest of our present scientific knowledge of plant physiology for the use of experts in that subject, but seeks to present to all who have interest to learn an accurate and vivid conception of the principal things in plant life. "I was once myself such a learner," the author remarks, "and I have tried to write such a book as I would then have delighted to read." He has sought especially to interpret those phenomena of plant life which come within ordinary observation and experience, omitting certain matters which, though of high technical interest, lie outside the experience of the general observer. He is a strong advocate of Darwinian adaptation, regarding causative adaptation as the most rational explanation we possess of the relations of living beings to their environment. While admitting that every individual process of plants is purely mechanical, physical, or chemical, the author assumes a vitalistic influence which holds these processes in orderly sequences—what he defines as a perfectly natural vitalism based on the superior interpretative power of an hypothesis assuming the existence in Nature of an X-entity, additional to matter and energy but of the same cosmic rank as these, and manifesting itself to our senses only through its power to keep a certain quantity of matter and energy in the continuous orderly ferment we call life.

Whether or no we are entirely in agreement with Dr. Ganong's premises, we must admit that he has given us a charmingly written book, in which the story of the living plant is clearly and attractively told. Even the titles of the chapters are translated into ordinary language. Thus chapter i., on "the various ways in which plants appeal to the interests and mind of man," is a readable explanation of the various methods of study in the science of botany, and at the same time a good exposition of the point of view taken by the author. The plan of the remaining chapters, seventeen in number, is as follows: The prevalence of the green colour and its meaning in the life of the plant is first explained, and then the general facts of the morphology and ecology of leaves and stems are dealt with as the result of the need for exposure to light. The work done by plants and the source of their power to do it is the text of a chapter on respiration, and so on. In this way the various life-processes are lucidly explained.

In later chapters pollination of flowers and dissemination of fruits are dealt with. The method of origin of new species and structures and the causes of their fitness to the places they live in is the heading of a chapter on evolution and adaptation; this is followed by a chapter on the improvements made by man in plant breeding, while a final chapter deals in a very general way with the great groups into which plants fall, including the ecological as well as the genealogical aspect. There are a large number of excellent diagrams and figures, and the book is beautifully printed.

A. B. R.

British Plant-Galls: a Classified Textbook of Cecidology. By E. W. Swanton. Pp. 287 × xv. Methuen & Co., Ltd. 7*s*. 6*d*. net.

All botanists on their rambles or forays have noticed the curious malformations of plants which they have usually, but of necessity, been content to designate "galls," except in those cases where the hypertrophy is caused by fungi. Most English works on the subject have dealt principally with the zoological aspect and have therefore not attracted the general run of botanists. We should imagine that Mr. Swanton's book will appeal to such as have no previous knowledge of the subject. The introduction gives a short but interesting historical account of these "supercrescences, productions, or excretions"; a *résumé* of Kerner's arrangement of insect and fungus galls, based on their form and general structure; notes on collecting and preserving galls; and a synoptic table of the genera of animal and fungus gall-causers of British plants. The interesting life-histories of the gall-causers—sawflies, wasps, beetles, moths, flies, aphides, mites, eel-worms, fungi, and Mycetozoa are then described and useful "economic notes" are added. Then follows a classified and descriptive catalogue of plant-galls. The primary division is botanical, the host-plants being arranged as in Engler's system; the galls on each are then tabulated according to the causative organism. There are a number of explanatory text-figures and thirty-two plates, half of which are coloured—the others mostly photographs. All the photographs are excellent. We think this could also be said of the originals of the coloured plates, but some of them have lost much in the printing. There is a useful bibliography and a full index. The book is cheap, useful, and interesting.

J. R.

An Introduction to the Chemistry of Plant Products. By Paul Haas, D.Sc., Ph.D., and T. G. Hill, F.L.S. 8vo, pp. xii, 401. London: Longmans. 1913. Price 7*s.* 6*d.* net.

Many of the problems of plant physiology require for solution a combination of botanical and chemical methods. The present work is an attempt to provide students of plant physiology with an introductory account of the chemistry and biological significance of some of the more important substances occurring in plants. The substances are treated under the following sections: (1) Fats, Oils, and Waxes, Phosphatides; (2) Carbohydrates; (3) Glucosides; (4) Tannins; (5) Pigments; (6) Nitrogen bases; (7) Colloids; (8) Proteins; (9) Enzymes. The subject-matter is mainly chemical; the classification, means of detection and quantitative estimation of the various substances are treated in detail, but a valuable summary is also given of the facts relating to the meaning of the substance in the life-history of the plant and its method of formation. Special reference may be made to the section on Proteins and those dealing with Enzymes, which should be of considerable interest to the general student of botany. The book fills a gap, and is a valuable contribution to botanical literature. The subject-matter is well arranged, and there is a useful index.

A. B. R.

BOOK-NOTES, NEWS, &c.

Conference on Plant Protection.—A Conference under the auspices of the Plant Protection Committee of the Selborne Society was held, by permission, at the Linnean Society's Rooms at Burlington House on September 19th. Dr. A. B. Rendle presided, and a large number of those interested in the botany of the British Isles were present. The Committee has recently secured the appointment of delegates from many of the Natural History Societies throughout the country to take up the subject of plant protection locally, and the object of the Conference was to secure an interchange of views between the delegates and others interested in our Flora. The Chairman gave a general *résumé* of the subject, pointing out the various main causes of the destruction of our native plants. Causes incident to increase of towns, drainage of country, and the like must be accepted, but the malign influence of large towns on surrounding vegetation might be lessened by rational methods of dealing with smoke, and it would often be found possible, if sufficient local interest were shown, to secure small reservations in which the native flora might be left undisturbed when areas were subjected to draining, clearing of trees, or laying out of golf-links. Reference was also made to the selfish methods of collectors and botanists which threaten the local existence of our rarer plants, and to the wholesale destruction effected, especially near large towns, by rooting up of plants for sale; while much might be done by education and extension of an interest locally in our native flora, it was difficult to see how the traffic could be effectively dealt with except by some form of legislation. An interesting discussion followed, in which various well-known botanists and some of the delegates took part, including Mr. G. C. Druce, Mr. Miller Christy, Dr. C. E. Moss, Mr. E. M. Holmes, Prof. Boulger, Mr. W. H. Griffin, and Mr. Step. Some difference of opinion was expressed on the question of a legislative measure. Botanists would naturally resent any additional restriction being placed on their movements by landowners. The Chairman, however, pointed out that before any attempt was made to obtain the passage of a Bill its provisions would be very fully discussed by all parties interested in plant protection, and that it should be possible to legislate in such a manner as to prevent the ruthless destruction of plants by uprooting for purposes of sale, without interfering with the liberty of the botanist.

A review of Dr. John Briquet's *Prodrome de la Flore Corse* was given in this Journal (1911, pp. 276–8) on the occasion of the publication of the first volume. The second volume is to appear in two instalments, the first of which is now to hand. It contains 409 pages, and carries the systematic account of the flora from *Papaveraceæ* to the end of *Leguminosæ.* In the interval since the preparation of vol. i., additional material has become available, notably that collected on an expedition in the south of the island in 1911. The work, which is on the same lines as in the previous volume, is eminently critical, and abounds with valuable notes of biological as well as of taxonomic interest. Dr. Briquet has our good wishes for the speedy completion of this useful work.

We learn from a recent issue (August 23rd) of *The Gardeners' Chronicle* that the establishment of a National Botanic Garden in the Union of South Africa is assured. The Government has provided a site—Kirstenbosch, an estate on Table Mountain—and promises a grant, including £1000 per annum for upkeep, provided that additional funds be forthcoming from other sources. To secure this additional support a National Botanic Society of South Africa has been founded. Sir Lionel Phillips and Sir P. de Villiers Graaff have been appointed by the Government to act as trustees for the Garden, and Prof. Pearson has undertaken the honorary directorship.

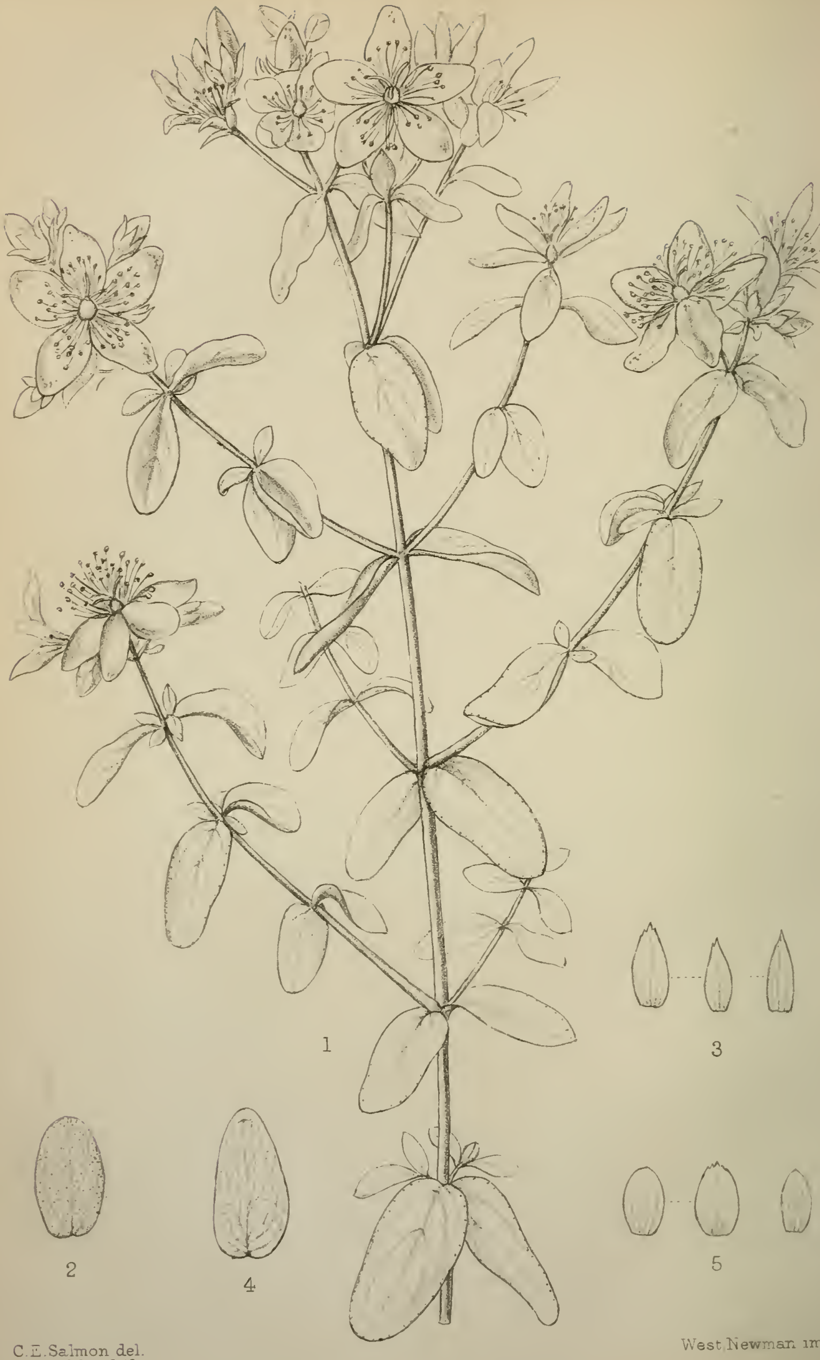
Newspaper Botany.—Mr. B. Paul Neuman, writing in *The Westminster Gazette* of Aug. 30 asks: "Is the field scabious that grows on its native downs in true Montessori fashion the perfection of its own kind, or is that perfection to be found in the larger, more richly coloured, more sweetly scented flower which the gardener by his interference has produced?" The botanist will be able to answer Mr. Neuman's question by pointing out that the two Scabiouses referred to belong to different species, if not to different genera.

We have received the *Report of the Botanical Exchange Club* for 1912 (vol. iii. parts 3 and 4, price 3*s*. 6*d*. each; Blackwell, Oxford), which was issued in August, and which we hope to notice later.

Mr. & Mrs. P. Amaury Talbot are continuing their work of botanical exploration in Southern Nigeria. It may be remembered that an account of their collections in the Oban district was recently elaborated by members of the staff of the Department of Botany and published by the Trustees of the British Museum. On their return to Nigeria last year Mr. and Mrs. Talbot continued their work in the Eket district and have despatched several consignments of plants to the National Herbarium. Though less interesting botanically than the Oban collections, those from Eket contain a number of novelties, descriptions of which it is proposed to publish in this Journal.

The Editor hopes to complete his *Catalogue of the Sloane Herbarium*, on which he has been engaged since his retirement from the National Herbarium, during the coming winter.

The death is announced of Mr. Peter Ewing, which occurred at a nursing home in Glasgow on the 3rd of August.



C. E. Salmon del.
P. Highley lith.
West, Newman imp.

Hypericum Desetangsii.

HYPERICUM DESETANGSII LAMOTTE IN BRITAIN.

By C. E. SALMON, F.L.S.

(PLATE 528.)

ABOUT ten years ago the receipt of a dried specimen of *Hypericum*, labelled *H. dubium* Leers, collected by the late Mr. T. Hilton near Lewes, Sussex, caused me to examine a number of examples, and to doubt the accuracy of the name given. A fresh specimen sent in 1908 strengthened the doubt, but the material was not sufficient foundation to build upon. I visited the locality a year or two later, but no flowering-heads could be seen; it was not until this season that time permitted a second visit with most satisfactory results. On a bushy hillside of the chalk were five or six splendid heads of a most showy St. John's Wort, at first sight not unlike *H. perforatum*, which grew close by, but on closer examination abundantly distinct; it was, as I had hoped, undoubtedly *H. Desetangsii.*

Under the name *H. quadrangulum* this plant was described by Des Étangs in Mém. Soc. Agricult. de l'Aube, extr. p. 24 (1841), and was also satisfactorily distinguished by Bellynck (Fl. Namur, 31, 1855), who named it *H. intermedium*, with the following description:—"Tiges de 3–9 décim., fermes, dressées, rameuses, à 4 angles peu saillants et non ailés. Feuilles ovales-oblongues, toutes parsemées de gros points noirs et de points transparents très-nombreux; à nervures non réticulées.—Sépales lancéolés-acuminés. Pétales striés de noir, dépassant longuement le calice. Fleurs assez grandes, d'un jaune doré, en panicules terminales."

In 1874 Lamotte, in Bull. Soc. Bot. Fr. xxi. 121, named it *H. Desetangsii*, and gave a long and careful description, of which the following is an abridgement:—

"Tige . . . munie dans le bas de quatre lignes saillantes dont deux presque membraneuses. . . . Feuilles larges, ovales-elliptiques ou elliptiques-oblongues, arrondies au sommet, rétrécies à la base, sessiles, couvertes de points translucides très-fins, moins abondants dans les feuilles supérieures, garnies sur les bords de points noirs, à nervures secondaires transparentes peu ramifiées. Fleurs grandes, 24 à 28 mill. de diamètre. . . . Sépales lancéolés-étroits, aigus, entiers ou subdentés au sommet, glabres, depourvus de points noirs. . . . Pétales d'un beau jaune doré, obovales-oblongs, arrondis au sommet, sans points noirs sur les faces . . . à bord . . . garni de quelques glandes noires. . . . Styles très-divergents, égalant à peine les étamines. . . . Capsules ovales, 7 millim. de long. . . . Graines très-petites, à peine 1 mill. de long . . . brunâtres."

Lamotte notes that it may be distinguished by its four-angled stem, shape of leaves, less narrow sepals, &c., from *H. perforatum*; by its translucently dotted leaves with veins less anastomosing, sepals narrower, &c., from *H. quadrangulum*; and by its size of flowers, shape of leaves, &c., from *H. tetrapterum*. He states that Des Étangs considered the plant intermediate between *H. quadrangulum* and *H. tetrapterum*, but that J. Gay placed it as a "forme remarquable" of *H. quadrangulum*.

In 1878 E. Bonnet, in Bull. Soc. Bot. Fr. xxv. 277, gave a detailed account of *H. Desetangsii* (which he segregated into *α genuinum* and *β imperforatum*) and allied plants. Space will not permit me to reproduce the article at length, but the more important points are contained in the following extracts:—

"*H. Desetangsii* Lamotte. Tige . . . très-rameuse dans le haut. . . . Feuilles . . . à limbe tantôt muni de gros points noirs et de ponctuations pellucides très-fines, tantôt dépourvu de glandes, et alors à nervures secondaires reticulées. . . . Inflorescence en panicule lâche. . . . Sépales souvent inégaux, lancéolés-acuminés, subulés ou érodés au sommet, tachés de quelques points noirs. Pétales ovales-oblongs, striés et ponctués de noir. Etamines 15–20 par androphore, un peu plus courtes que la corolle et plus longue que le pistil. Styles de la longueur de l'ovaire. Capsule . . . ovoide-allongée. Graines noires.

"*α genuinum*: feuilles à nervures non réticulées, criblées de ponctuations excessivement fines, très-nombreuses sur les feuilles supérieures, moins fréquentes ou même très rares sur les inférieures; sépales étroits, lancéolés-aigus, subulés. . . .

"*β imperforatum*: feuilles dépourvues de ponctuations pellucides, à nervures secondaires réticulées-transparentes; sépales inégaux, souvent deux plus courts un peu obtus, entiers ou érodés au sommet, les trois autres plus étroits, acuminés, subulés ou denticulés. . . ."

It will be noted that some of the details amend those given by Lamotte, particularly as to the black glands on sepals and petals.

For the purpose of comparison, Bonnet's description of *H. quadrangulum* L. is given below in shortened form:—"Tige . . . ordinairement simple. . . . Feuilles . . . à nervures secondaires réticulées-anastomosées, à limbe dépourvu de perforations pellucides. . . . Inflorescence en panicule dense. . . . Sépales ovales-elliptiques, entiers, très-obtus, tachés de points noirs. . . . Petales . . . ovales-oblongs, tachés en dehors de points et de linéoles noirs nombreux. Etamines 20–25 par androphore, du quart plus courtes que la corolle et à peu près aussi longues que le pistil. Styles un peu plus longs que l'ovaire. Capsule . . . . ovoide . . . Graines . . . d'un brun clair . . ."

Bonnet sums up by saying that *H. Desetangsii* is easily distinguished from *H. quadrangulum* by its taller stem, laxer inflorescence with longer branches, narrower sepals, which are never oval-obtuse, petals less strongly striated or dotted with black glands, more elongated capsule, and by seeds being blackish and not light brown.

H. Schinz throws further light upon these plants in Bull. Herb. Boiss. 2nd ser. iii. 10 (1903), and compares *H. Desetangsii* with *H. quadrangulum* (of which he creates two varieties, *erosum* and *punctatum*) and *H. acutum* (= *tetrapterum*).

Very few good figures seem to exist of *H. Desetangsii.* That in Coste's Fl. Fr. i. p. 259, 1901, is small but satisfactory.

No plates in Reichb. Icon. Fl. Germ. exactly agree; No. 5178 is the nearest, but the flowers are too small; it is probably correctly named *quadrangulum* × *tetrapterum.* A similar plant is figured in Fl. Dan. t. 2837. Reichb. Icon. Fl. Germ. No. 5180, has the sepals too obtuse; it is labelled *H. commutatum* Nolte.

Rouy & Foucaud (Fl. Fr. iii. 336, 1896) consider *H. Desetangsii* and *H. undulatum* as two subspecies under *H. acutum* Moench (= *tetrapterum*), but the former, at any rate, would be better placed, I think, under their *H. quadrangulum*, of which it has the large flowers, bright yellow petals, non-winged stem, &c.

There is no doubt that *H. Desetangsii* has been confused with hybrids of *H. quadrangulum* and *H. tetrapterum*, or even *perforatum*, but I think a good case has been made by the botanists mentioned above for *H. Desetangsii* as a species next to *H. quadrangulum.*

Bonnet's *H. Desetangsii α genuinum* is represented in Soc. Dauph. 1880, No. 2409, and agrees well with the Lewes plant upon which Prof. L. Corbière has reported: "Je crois que votre plante est bien *H. intermedium* Bellynck = *H. Desetangsii* Lamotte."

The plant distributed by the Société Dauphinoise (1879, No. 1998) represents Bonnet's var. *imperforatum*, which I have not seen in a fresh condition; the dried example in Hb. Kew is a fruiting specimen only, and is not very convincing.

The Lewes plant certainly comes under *H. Desetangsii genuinum*, yet the sepals were noticeably unequal in shape and size upon the same calyx and often denticulate or even more or less eroded at the end. Grenier (Fl. de la Chaine Jurass. 154, 1865) aptly remarks upon the same feature:—"Sépales lancéolés, aigus ou subulés, érodés, ce qui rend leur terminaison indécise."

Babington's var. *maculatum* of *H. dubium* Leers (Man. Brit. Bot. ed. 3, 58, 1851) is not the plant under discussion; type specimens of this have kindly been lent me by Dr. C. E. Moss for examination.

H. Desetangsii has been recorded from Eastern, Northern, and Central France and Belgium (*Nyman*), Germany, Spain, and Italy (*Rouy & Foucaud*), and Switzerland (*Schinz*). England: Richmond, Yorkshire, *R. B. Bowman* (*Hb. Kew*), and near Lewes, Sussex. It will probably occur in other places in Great Britain.

Explanation of Plate 528.—1. *H. Desetangsii α genuinum*, drawn from a fresh Lewes specimen, nat. size. 2. Upper leaf of same, nat. size. 3. Sepals of same, twice natural size. 4. Upper leaf of *H. quadrangulum*, nat. size. 5. Sepals of same, twice natural size.

NEW RUBIACEÆ FROM TROPICAL AMERICA.—III.

By H. F. Wernham, B.Sc.

(Continued from p. 221.)

The types of the first two novelties following are preserved in the herbarium of the New York Botanical Garden, and I am greatly indebted to the kindness of Dr. N. L. Britton, the Director, for the use of the material for examination. The specimens are taken from the collection made in 1910–11 by Dr. Shafer in the province of Oriente, Cuba. The other specimens described are in the National Herbarium.

Portlandia involucrata, sp. nov. Frutex 1–2-pedalis omnino glaber, ramulis rugoso-striatis nodosis lignosis; *foliis* sæpius 3-verticillatis coriaceis obovato-lanceolatis apice rotundatis basin versus in petiolum brevissimum v. obsoletum leniter angustatis, margine involutis, venis nisi centrali omnino opertis, *stipulis* parvis acutis nec conspicuis; *floribus* . . .; *capsulis* nigris majusculis ellipsoideis in ramulorum brevium apice terminalibus sessilibus, apicem versus in calycis limbi persistentis lobis lineari-oblongis obtusis coronam leniter angustatis, basi bracteolis foliosis decussatis arcte cinctis.

Fr. Dec. 31st, 1910. Camp La Gloria, across Sierra Moa, to Moa Bay, *Shafer*, 8282.

Leaves 3·8 cm. × 1·5 cm., petiole up to 6 mm. *Capsule* 1·8 cm. long, 1·1 cm. wide, with calyx-limb 1·1 cm. long, of which the tube occupies only 1 or 2 millimetres.

A very distinct and evidently xerophilous species, characterized by the small leathery blunt leaves and the involucre of bracteoles. The latter character and the habit suggest that this may be the type of a new genus, but, in the unfortunate absence of flowers, the plant must be relegated to *Portlandia*—the characters of the capsule and seeds being typical of that genus.

Portlandia uliginosa, sp. nov. Frutex verisimiliter resinosus sarmentosus 10-pedalis, ramulis novellis brevissime subglanduloso-pubescentibus mox glabrescentibus lignosis; *foliis* parvis subcoriaceis, obovatis apice rotundatis basi in petiolum brevem minute puberulum attenuatis, supra nitentibus utrinque glaberrimis, venis nisi centrali prominente omnino occlusis, *stipulis* minimis vaginam brevissimam formantibus; *floribus* . . .; *capsula* parva angusta basi in pedicellum obscure puberulum attenuata, apice calycis limbo persistente tubo brevissimo et lobis longis subulatis subacutis coronata, glabra, obscure costata.

Trail, Rio Yamaniguey to Camp Toa, 1300 ft., in moist thickets, *Shafer*, 4018.

In spite of the absence of flowers the characters of the capsule and seeds lead me to class this plant unhesitatingly as a species of *Portlandia*. In leaf-character it resembles the preceding species, which may be its nearest ally; but it is readily distinguished by the pubescence and the absence of a capsular involucre.

Leaves 2·9 cm. × 1·4 cm., petiole 4·5 mm. *Pedicel* 1 cm., *capsule* 1·4 cm. long (exclusive of calyx-limb with tube 1·5 mm. and lobes about 1 cm.) and 6 mm. wide.

The types of the remaining species are in the National Herbarium.

The following two specimens from Rio de Janeiro may be assigned to a new species approaching *Alseis involucrata* K. Sch.; but they seem to be quite distinct on vegetative and fruit-characters alone; no flowers are, unfortunately, available at present.

Alseis Gardneri, sp. nov. Frutex majusculus ramulis subteretibus, novellis quadrangularibus ferrugineo-pubescentibus; *foliis* oblanceolatis ad ellipticis vix acuminatis obtusissimis, basi angustatis brevissime petiolatis, validiuscule chartaceis, supra asperulo-pubescentibus subtus præcipue in venis ut in petiolo ferrugineo-pubescentibus, *stipulis* ovatis acuminatis subacutis coriaceis dorso carinatis concaveis; *inflorescentia* rachide ut ramuli induta, foliis multo breviore, floribus sessilibus . . . ; *capsula* oblanceolata ferrugineo-pubescenti plus minus glabrescente, basin versus leniter attenuata.

Rio de Janeiro: Corcovado, *Gardner*, 5484; Ilha do Governador, *Miers*.

Leaves 11–16 cm. × 5·5–7 cm., petiole rarely so much as 1 cm. long—at least in the ultimate leaves; secondary nerves 8–11 pairs; *stipules* 8 mm. × 4 mm. *Spike* at most 9–10 cm. long, including peduncle 3·3 cm. *Capsule* 1·3 cm. long.

The chief distinguishing features, in comparison with the species named above, are the shape and venation of the leaves, with their much shorter stalks and smaller stipules, and the laxer, longer inflorescence, spicate rather than capitate.

Cosmibuena gorgonensis, sp. nov. Arbor 18-pedalis glabra, ramulis cortice pallido rugosulo indutis; *foliis* coriaceis obovatis v. ellipticis nec acuminatis, apice rotundatis, basi vix angustatis, breviter petiolatis, venis secundariis paucis sæpius obscurissimis; *stipulis* membranaceo-foliosis obovato-lanceolatis apice rotundatis. *Floribus* candidis pedicellatis in ramulorum apice 3–5-natis; *calycis* limbo acute 5-dentato ovarium subtubulare fere æquante; *corollæ* tubo inter breviores, lobis ovali-oblongis apice rotundatis; *ovario* basi leniter in pedicellum attenuato, *stigmate* exserto 2-lobo. *Capsula* terete elongata.

On loam-soil, by the sea, Island of Gorgona: *Barclay* 919. Differs from *C. macrocarpa* Kl., its neighbour in the same island, chiefly in the stalked flowers, with shorter corolla-tube and narrower, acute calyx-lobes.

Leaves 10–11 cm. × 5·5–6 cm., petiole 1–1·5 cm.; *stipules* 1·5–2 cm. × 9–10 mm. *Pedicel* about 5 mm. *Calyx* 5 mm., lobes 2·3 mm. *Corolla*-tube 5–5·8 cm., lobes 2 cm. × 1·1 cm. *Ovary* 1 cm. long. *Capsule* 6 cm. or longer, 6–7 mm. wide, the length including the persistent disc 2·5 mm. high.

Cosmibuena gardenioides, sp. nov. Omnino glaber, ramulis angularibus compressis rugosulis; *foliis* coriaceis ovalibus v.

ellipticis utrinque rotundatis, longiuscule petiolatis, venis secundariis numerosis obscuris, *stipulis* oblongis apice rotundatis caducis; *floribus* 2–3-natis pedicellatis, *calycis* limbo fere ad basin in laciniis ovato-triangularibus subacutis diviso; *corollæ* tubo inter breviores gracili, lobis 5 elliptico-oblongis; *ovario* calycem multo superante oblongo, basi in pedicellum validiusculum leniter attenuato, *stylo* longiuscule exserto, *stigmate* breviter bilobo.

Colombia: Cauca, 4875 ft., *Lehmann* 1955.

Related to *C. grandiflora* R. & P., but readily distinguished by the much shorter corolla; also to *C. gorgonensis* (*supra*), from which it is separated by the differently shaped leaves with longer stalks and closer venation, &c.

Leaves 11 cm. × 6·7 cm.; petiole 2 cm.; secondary nerves 12 or more pairs; *stipules* 1·5 cm. or longer. *Pedicel* 5 mm. or slightly longer; *calyx*-lobes 3–3·5 mm.; *corolla*-tube barely 4 cm. long, lobes 2·2 cm. × 1·1 cm.; *style* exserted over 1 cm.

Chiococca erubescens, sp. nov. Glaberrimus, in siccitate sæpius erubescens, ramulis obtuse quadrangularibus; *foliis* chartaceis amplis, ovatis, ellipticis v. oblongis breviter acuminatis obtusis, breviter petiolatis, *stipulis* latis brevibus apiculatis persistentibus; *inflorescentiis* simplicibus paucifloris, brevibus foliis multo brevioribus; *calycis* limbo patente dentibus brevibus latis ovatis subacutis; *corolla* extus glabra lobis minusculis triangularibus; *ovario* glabro angusto subtubuloso-infundibulari, basin versus in pedicellum brevem attenuato.

Guiana: *Hb. Rudge*. Cayenne: *Martin*. Venezuela: *Funcke & Schlim*, 149. (The two last are in the Kew Herbarium.)

Readily distinguished by the large leaves, glabrous even when young, the short, simple inflorescences, and the narrowly funnel-shaped ovary.

Leaves 14–20 cm. × 7–11·8 cm., petiole 7 mm.; secondary nerves, 7–10 pairs; *stipules* as broad as the branchlet, with sheath 2 mm. deep and apiculus 2 mm. long. *Peduncle* up to 2 cm. or longer, *inflorescence* to 6 cm.; *pedicels* to 2 mm.; *ovary* and *calyx* 2–2·5 mm. *Corolla*-tube 9 mm., 5 mm. wide at the mouth, lobes 2 mm.

The following interesting plant was collected by James Anderson, naturalist to Capt. King's South American Expedition (1829-30), probably in Trinidad, but the locality is unfortunately uncertain. The label bears the name which I propose to adopt, *viz.*:—

Chiococca pulcherrima, sp. nov. Frutex glaber ramulis nisi novellis complanatis teretibus; *foliis* lanceolatis utrinque attenuatis subacutis, subcoriaceis, venis secundariis obscuris, petiolo longiusculo valde compresso, *stipulis* latis brevibus apiculatis coriaceis, parte inferiore persistente; *racemis* laxissimis paucifloris folia subæquantibus, *bracteis* minimis lanceolatis, *floribus* longepedicellatis; *calyce* breviter obtuse dentata; *corolla* late infundibulari infra medium in laciniis oblongis obtusis divisa; *ovario* subgloboso.

Trinidad (?): *Anderson* 308.

According to the label, "This beautifull shrub grows on the summits of the highest mountains—is scarce."

This species is readily distinguishable from the others of the genus by the long narrow leaves, acuminate at both ends, and the lax inflorescences of a few (5–6) flowers with long stalks.

Leaves 7–11·5 cm. × 1·5–3·3 cm., petiole 1–2·2 cm., secondary nerves to 9–10 pairs; *stipules* 3–4 mm. or longer, the apiculus sometimes as much as 3 mm. Flowering *racemes* 4–5 cm. long, increasing to 10 cm. or more in fruit. *Pedicels* 1·5 cm. in flowering stage, rapidly increasing to 2·5 cm. or more as the fruit matures. *Calyx* 2·2 mm. *Corolla*-tube 2·5 mm., lobes 3 mm.

Chiococca capitata, sp. nov. Verisimiliter frutex erectus ramosus, lignosus, glaberrimus, ramulis striatis, mox cortice pallido cinereo indutis nodosis; *foliis* valide chartaceis, ellipticis utrinque angustatis acutis, venis secundariis paucis occlusis; *floribus* parvis breviter pedicellatis, in cymis subcapitatis parvis multifloris sessilibus congestis; *calycis* lobis anguste lanceolatis acutis; *corolla* anguste infundibulari-tubulosa, lobis latis minusculis reflexis; *antherarum* apicibus exsertis; *ovario* angusto calycem subæquante v. paullo superante, basi attenuato.

Jamaica: *Wright.*

Very distinct in the sessile heads of small subtubular flowers. The progressive abbreviation of the inflorescence seems to have been one of the chief evolutionary tendencies within the genus *Chiococca*; this is illustrated in the following series: *C. brachiata*, with elongated inflorescence much exceeding the leaves; *C. parvifolia*, with inflorescence barely half as long as the leaves; and *C. capitata*, the present species, in which the maximum of abbreviation has been attained by the close aggregation of the flowers into a head. This congestion is doubtless correlated with the narrow, subtubular form of the corolla.

Leaves 3–4·7 cm. × 1·5–2 cm., with petiole rarely so much as 6 mm. *Heads* barely 1 cm. in diameter, even including the corollas. *Pedicels* to 1·5 mm. *Calyx*-lobes less than 1 mm. *Corolla* 5–6 mm. long, 1·5 mm. wide at the mouth, lobes barely half a millimetre.

Chiococca pachyphylla, sp. nov. Arbor nisi inflorescentia glabra, ramulis rugosulis, lignosis; *foliis* crasse coriaceis, ellipticis breviter acuminatis obtusis basi acutis petiolatis, supra nitentibus subtus discoloribus, venis centrali supra impressa subtus prominente secundariis utrinque 7–8 manifestis nec tamen conspicuis, *stipulis* latissimis brevibus vaginantibus apiculatis persistentibus; *inflorescentiis* laxiuscule paniculatis minute pubescentibus demum glabrescentibus, folia subæquantibus vel superantibus, *bracteis* minimis; *calycis* lobis ovato-oblongis obtusissimis brevibus; *ovario* breviter tubuloso mox subgloboso, in *bacca* globosa glabra breviter pedicellata, a calycis limbo erecto persistente coronata maturante.

Mexico: Between Acatlan and Chiconquiaio, *Schiede & Deppe.*

Very distinct in the thick leathery leaves and long paniculate inflorescences. Apparently related to *C. coriacea*, also a Mexican species, but differing especially in the shape of the leaves and stipules, and in the relative lengths of leaves and inflorescence.

Leaves 8·5–11·5 cm. × 3·3–4·8 cm., petiole 1 cm.; *stipules*, including apiculus, 3–4·5 mm. *Peduncle* about 3 cm., panicle about 8 cm. of additional length. *Calyx* and *ovary* together not exceeding 3 mm.; *pedicel* about 3 mm. or less.

MISCELLANEA BRYOLOGICA—II.

By H. N. Dixon, M.A., F.L.S.

(Continued from p. 247.)

Ditrichum flexifolium (Hook.) Hampe.

In the course of revising the New Zealand species of *Ditrichum* I arrived at some conclusions with regard to the above-named moss, which, being of considerably wider application than the Australasian forms, it may be worth while to put on record here.

The *Flora of New Zealand* describes two species of *Trichostomum*, *T. laxifolium* H. f. & W., and *T. setosum* H. f. & W., clearly closely allied to one another. The latter was recognized later to be identical with the Chilian *Leptotrichum affine* C.M., and has been known recently as *Ditrichum affine* Hampe. The authors of the *Flora of New Zealand* recognized the identity of their *T. laxifolium* with the South African *Dicranum flexifolium* Hook. Musc. Exot. t. 144 (1820), but they did not retain the specific name, partly at least, no doubt, in consequence of the existence of *Dicranum flexifolium* Hornsch. (1826), which would at that time be considered properly placed in *Dicranum*, though now known as *Campylopus flexifolius* (Hornsch.) Bry. Jav. In accordance with modern views of nomenclature, however, *Dicranum flexifolium* Hook. must in any case have the priority, and this was recognized by Hampe, who applies the name *Ditrichum flexifolium* (Hook.) to the Australasian *Trichostomum laxifolium* H. f. & W. For some reason or other he has not been followed by later authors, and the two New Zealand plants have continued to be known as *Ditrichum affine* (C.M.) and *D. laxifolium* (H. f. & W.).

After careful comparison of numerous specimens from Australia and New Zealand, I have been led to the conclusion that these two plants represent two very slightly different forms of one and the same species. I have given my grounds for this conclusion in the revision above referred to, and they need not be repeated here.

To avoid error, and in the absence of information as to the grounds on which Hampe restored Hooker's name (*flexifolium*) for the New Zealand plant, I have carefully examined the type of Hooker's *D. flexifolium*, based on specimens gathered by Menzies at the Cape of Good Hope in 1791. These show the same variations as are exhibited by the Australasian plants (which in part at least have led to their segregation as *D. affine* and *D. laxifolium*), and there can be no doubt I think of their belonging to one very widely distributed species. Further, the South African plants of Ecklon and Gueinzius, on which C. Müller has based his *Leptotrichum capense*, are undoubtedly the same thing.

I have also examined original specimens of *D. plicatum* (Mont.), (*Leptotrichum plicatum* C.M.) from South India, and these are without question the same. C. Müller separates this species in the Synopsis from those above referred to as having the leaves curled ("folia crispata"), as against "folia secunda"; but the value of this distinction is minimized by his description of the leaves of *L. capense* as "crispa," while *L. affine* is described (p. 452, sub *L. Boryanum*) as "foliis crispatis." He also describes the Indian species as having the capsule "cylindrica erecta"; but this is by no means borne out by the specimens, where the capsule when well developed shows the slightly curved, asymmetrical form characteristic of the whole of this group.

I have not seen the Isle of Bourbon plant, but from C. Müller's description in the Synopsis, and from the recorded distribution (Réunion, Madagascar), I am driven to conclude that the Isle of Bourbon *L. Boryanum* is absolutely identical with the South African species. Furthermore, the Javan plant referred to *L. Boryanum* by C. Müller and by the authors of the Bry. Javanica must also be placed here. Fleischer, it is true, now retains the Javan plant distinct as *Ditrichum difficile* (Duby), but he gives no reason for so doing beyond saying that he is doubtful if it is identical with the Bourbon species, not having seen specimens. In the descriptions and figures of the Javan plant I find nothing to suggest a difference from *Dicranum flexifolium* Hook. except on one point, that both the Bry. Jav., tab 76, and Fleischer depict the leaf base as having the nerve quite narrow (about one-fifth the width of leaf) and well defined,* whereas in *D. flexifolium* it is much wider and ill-defined at margin. However, examination of Javan plants does not bear out the figures. Both Fleischer's specimens (M. Fr. Arch. Ind. No. 28, as *D. Boryanum*) and specimens in the British Museum, leg. Lacoste, show the nerve very wide and ill-defined, often fully one-third the width of the leaf-base, and, in the older leaves, bright orange in colour. The sheathing leaf-base is not very easy to flatten out, and when conduplicate it gives the impression that the nerve is quite narrow and well-defined, and this is possibly the cause of the error. The appearance is due, I believe, to the strongly thickened dorsal band of stereid cells in the middle of the nerve, which is prominent, and, together with the position of the deuter cells, gives the appearance by transmitted light of being itself the complete nerve, instead of being only the central portion. On flattening out a leaf-base the nerve is distinctly seen to be as described above.

D. Boryanum is, it is true, separated by Brotherus from

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* The authors of the Bry. Jav., however, describe it as *costa lata, applanata.*

D. capense, &c., as being dioicous (not autoicous); but C. Müller described it originally as autoicous. The Javan plant is described by Fleischer as both autoicous and dioicous, which may perhaps account for the discrepancy having arisen.

The distribution of *D. flexifolium* may be summed up as follows:—South Africa, Madagascar, East African Islands, India, Java, New Caledonia, Australia, Tasmania, New Zealand, Patagonia, Chile.

The following, then, will be the synonymy:—

DITRICHUM FLEXIFOLIUM (Hook.) Hampe in Flora, 1867, p. 182.
Dicranum flexifolium Hook. Musc. Exot., t. 144 (1820).—Non *Dicranum flexifolium* Hornsch. e Schwaegr. Suppl. ii., 115 (1826).
Trichostomum laxifolium H. f. & W., Fl. of N.Z., ii. 72.
Ditrichum laxifolium Mitt. in Trans. and Proc. Roy. Soc. Victoria, 1882, p. 51.
Leptotrichum affine C.M. in Bot. Zeit., 1847, p. 825.
Cynontodium affine Mitt. M. Austro-Amer., p. 42.
Ditrichum affine Hampe, *op. cit.*
Trichostomum setosum H. f. & W., Fl. of N.Z., ii. 73, t. 84.
Leptotrichum capense C.M., Syn. i. 453.
Ditrichum capense Par. Ind. p. 392.
Leptotrichum plicatum C.M. Syn. i. 446.
Didymodon plicatus Mont. Syll., p. 49.
Didymodon cirrifolius Mont. in Ann. Sc. Nat., 1842.
Ditrichum plicatum Hampe in Nuov. Giorn. Bot. Ital., 1872, p. 273.
Leptotrichum Boryanum C.M., Syn. i. 452.
Ditrichum Boryanum Hampe in Fl., *loc. cit.*
Trichostomum difficile Duby, in Moritzi, Verz. d. Zoll. Pfl. p. 134.
Ditrichum difficile Fleisch. Die Musci der Fl. von Buitenzorg, i. 300.

SOME THUIDIA OF AUSTRALASIA AND OCEANIA.

Thuidium erosulum Mitt. Sam. M., p. 186 (1867).

Paris, Ind., ed. ii., makes *T. erosulum* Mitt. a synonym of *T. faulense* (Reichdt.) Jaeg. (*Hypnum faulense* Reichdt. in Verh. d. K. K. zool. bot. Ges. in Wien, 1868, p. 196), on what authority I am unaware. If the identity were established, it is obvious that Mitten's name must be retained, and this has been done in Brotherus, Musci, ii. 1013, where *T. erosulum* Mitt. is found alone, no mention being made of *T. faulense.*

T. erosulum belongs to a group of delicate species, having the branching prettily plumulose, and marked by having the nerve of the branch-leaves prominent in a ridge at the back, and more or less cristate or toothed towards its apex. They are autoicous, and usually have a scabrous seta. The cristate nerve is characteristic also of certain more robust dioicous species. It is easily remarked when the branch leaves are dry or only partially moistened out, as they are then readily viewed in profile, but when fully moistened they frequently become more or less complanate, in which case it is difficult to get the back of the nerve in profile, and the cristate structure may easily be overlooked.

Through the kindness of Mrs. Britton I have been able to examine more than one of Mitten's specimens of his *T. erosulum*, including the type (Fiji Islands, Milne, 48) and co-type (Samoa, Powell, 14), and to compare these with the original gathering of *H. faulense* (Novara Exped., leg. Reichhardt, Faule, No. 50, in Mus. Brit.). The differences are not very great, but they appear to me to be quite constant and well-marked. The leaves in *T. faulense* do not flatten out on moistening to the same extent as in *T. erosulum*, the branch leaves are more pointed, the cells of lamina more pellucid, and the nerve on the contrary more opaque, so as to show darker, by transmittent light, than the rest of the lamina. In *T. erosulum* the cells are obscure with papillæ and more opaque, while the nerve is on the contrary pellucid, and shows as a pale translucent line against the darker cells. The ultimate branch-leaves are oval and very obtuse.

Mr. G. Webster has sent me two plants, labelled "No. 563, Tongoa Santo, New Hebrides, leg. Rev. F. Bowie, 1909," and "No. 760, Wintoa S. Bay, Makalula, New Hebrides, leg. Rev. R. Boyd, 1912," both of which are certainly Mitten's species. A further specimen, "No. 582, Atherton, Cairns, Queensland, leg. Allen, 1906," is quite indistinguishable from *T. erosulum*. It is sterile, and it is possible, of course, that fruiting characters might reveal some differences from the Oceanic plant, but I do not think this likely, and I should refer it to Mitten's species with little doubt. It is not the Australian *T. plumulosiforme* (Hampe), which has more closely plumulose ramuli with the leaves scarcely altered when dry. In *T. erosulum* and its allies the branch leaves when dry are curled and strongly incurved.

Thuidium faulense (Reichdt.). Although *T. faulense* is distinct from *T. erosulum*, it is not, I think, a good species, but is identical with *T. Meyenianum* (Hampe) Bry. Jav. I have compared it with Hampe's type of that species, leg. Meyen, and I can find no difference. A comparison of Reichhardt's figures of his *T. faulense* with Bry. Jav. tab. 224 (*T. Meyeniannm*) shows very little difference, except in the form of the stem leaves; but examination of the actual specimens does not bear out this difference; in the type of *T. Meyenianum* they are rarely so longly accuminate as figured in the Bry. Jav., but in *T. faulense*, where well developed —*i.e.*, where the stems are well branched and not stoloniform —they are quite identical with the corresponding ones in *T. Meyenianum.*

The distribution of the two species, so far as I am aware, is as follows: *T. erosulum*—Samoa, Fiji, New Hebrides, Queensland; *T. Meyenianum* — Philippines, Saparœa, Banca, Java, Faule (Stewart Atoll, Solomon Islands).

Thuidium plumulosiforme (Hampe) Jaeg. This species was described by Hampe from specimens in the Melbourne Museum, collected in New South Wales by S. Johnson, and also in Eastern

Australia by Eaves. A specimen from Victoria recently sent me for determination by Mr. G. Webster, "No. 775, Johnsonville, Gippsland, 1906, leg. Edgar," is certainly Hampe's species. It differs from *T. plumulosum* (Dz. & Mb.) Bry. Jav. principally, if not entirely, in the smooth seta.

T. plumulosum is separated by Brotherus from the remaining species of Eu-thuidium by the rough seta, for the purposes of the key. It may be remarked, however, that the branch leaves possess the cristate nerve precisely as in *T. plumulosiforme* and its allies, and it certainly belongs to that group.

A further species of the same group, and one somewhat uniting it with the group containing *T. erosulum*, &c., is *T. campbellianum* (Hampe) Jaeg. A specimen of Thuidium from the New Hebrides, also sent me by Mr. Geo. Webster, "No. 768, Wintoa S. Bay, Malakula, leg. Rev. R. Boyd," is certainly Hampe's plant, agreeing quite well with the type in Hampe's herbarium. It differs from all the others of the group that I know (I am not acquainted with *T. lauterbachii* Broth. from New Guinea) in the character of the branch leaves, which are large, elliptical-oblong, somewhat flattened out, and spreading when moist, not acuminate and appressed as in *T. ramentosum* Mitt., &c.; with nerve pellucid as in *T. erosulum* Mitt. (which, however, has much smaller and more obtuse branch leaves), and bearing one or two sharp denticulations at the back above, towards the apex. The leaves, also, are sub-crisped and incurved when dry, as in the latter. It is a dioicous species, and Mr. Boyd's specimen is sterile, with perichætia, one of which, perhaps the only fertilized one, has the bracts strongly ciliate.

Thuidium bifarium Bry. Jav. A further plant received from Mr. Webster, "No. 657, Tongoa Santo, New Hebrides, Rev. F. Bowie, 1906," appears to me to be quite inseparable from *T. bifarium* of the East Indies. The New Hebrides plant is somewhat more robust, with the leaves at times exceptionally large, but that is the only difference to be detected. In this it agrees with *T. subbifarium* Broth. from New Guinea, but there the cells are smaller and more obscure than in *T. bifarium*, while here they are, if anything, larger than the normal forms of that species, and frequently much more pellucid and distinct. The gathering, however, shows considerable variation in these respects, even on the same stem, and I am not inclined to lay great stress on this character of the cells, especially as a Himalayan plant, which Mons. Cardot thinks cannot be separated from *T. bifarium*, has the cells distinctly larger and more distinct than in Javan specimens (*e.g.*, Fleischer, M. Fr. Arch. Ind. No. 479).

Thuidium suberectum (Hampe) Jaeg. A Thuidium from Mount Cook district, alt. 2500–5000 ft., South Island, New Zealand, leg. Jas. Murray, No. 97, has given me considerable perplexity. In my account of these New Zealand mosses (Journ. of Linn. Soc., Bot., xl. 457) I referred it with hesitation to *T. denticulosum* Mitt., which I had not then seen. A specimen of Mitten's type, however, kindly sent me by Mrs. Britton, shows this determination to be incorrect. Later, a moss sent me by Mr. Webster, under two numbers, "No. 776, Buffalo Mountains, Bright, Victoria, leg. Miss Miller," and "No. 777, Fern Tree Gully, Victoria," both ex herb. Murdoch, clearly represented the same thing, and on comparison of these with the type of *T. suberectum* in Hampe's herbarium I found they agreed well with that plant. *T. suberectum* is new to New Zealand; it is allied to and not unlike *T. furfurosum* (H. f. & W.), but is a brownish, more delicate plant, with shorter branches, and the leaves quite different. The stem leaves are small, with very short points; the branch leaves widely cordate-ovate, concave, very shortly and widely pointed with obscure, lowly papillose cells, and weak, pellucid nerve. They are not curled when dry, but simply incurved, so that the branches become catenulate and terete. Short-leaved forms of *T. furfurosum* not infrequently have the same appearance when dry, but are at once recognized, under the microscope, by the triangular-ovate leaves with long acuminate points.

Thuidium orientale Mitt. MS. in sched., sp. nov.

T. glaucino Mitt. et *T. glaucinoidi* Broth. affine. Ab hoc differt foliis caulinis *brevioribus*, minus acuminatis, siccis magis appressis; ab illo foliorum rameorum ramulinorumque papillis *singulis* nec furcatis; ab utroque foliis caulinis distincte præcipue siccitate *biplicatis*, et costa dorso *conspicue pulchre cristata*. Hab. Penang, Malay Peninsula, leg. C. Curtis, 1896.

The specimen on which this interesting species is founded was sent to Mitten by Rev. C. H. Binstead for determination, and returned with the name "*Thuidium orientale* Mitt. Hb." on the envelope. No specimen or notes are to be found in Mitten's herbarium, and I have drawn up the diagnosis entirely from my own examination. The species is unique among the Thuidia, so far as I am aware, in the highly cristate back of the nerve of the stem leaves; the nerve in the branch leaves is not so, nor indeed is it even prominent at the back.

Mitten described his *Leskea glaucina* from Hooker's Himalayan plant, 1173*b*, and he cites for it other localities in India, Assam, and Ceylon, adding "etiam in Java." The Javan plant is figured in the Bry. Jav. as *Thuidium glaucinum* (Mitt.); but there is a marked, though inconspicuous, difference between this and the true *T. glaucinum*, detected by Brotherus, in the papillæ of the branch leaves, which in Mitten's species are furcate above with two or more points, while in the Javan plant, to which Brotherus has given the name *T. glaucinoides*, they are single, usually pointing forward. According to my observation, the latter also has more longly pointed stem leaves, which are less closely appressed when dry. *T. orientale* has distinctly shorter points to the stem leaves than *T. glaucinoides*, and they differ from those of both species in being conspicuously biplicate, especially when dry.

Both *T. glaucinum* and *T. glaucinoides* have a wide distribution, the latter having, on the whole, a more eastern range, although

T. glaucinum, which is especially distributed in continental India (where the other species has not yet been detected), occurs also (according to Mitten) in Japan. Brotherus gives the distribution of *T. glaucinoides* from Birma to the Liu-Kiu Islands and the Bismarck Archipelago, which range I am able considerably to extend, as I have received plants undoubtedly belonging to this species from Malua, Upolu, Samoa, collected by Rev. J. W. Hills, and also from Tongoa Santo, New Hebrides, leg. Rev. F. Bowie (Nos. 564, 648), sent me by Mr. G. Webster.

ASTOMUM LEVIERI Limpr. IN AFRICA.

Among a small collection of mosses made by Mr. A. Ruddle at Tlemçen, Northern Algeria, in April, 1913, and sent to me by Mr. W. R. Sherrin for determination, was a small quantity of an Astomum, which I have no hesitation in determining as *A. Levieri* Limpr., which has not, I believe, been recorded from beyond Europe hitherto. It differs from *A. crispum* in the somewhat larger size, the plane margins of the leaves, and especially in the capsule, which has a separating lid. The Algerian plant, though immature, showed a ring of circumscribing cells to the lid, which also under pressure manifested a distinct tendency to separate at this line.

REPORTS OF DEPT. OF BOTANY, BRITISH MUSEUM, 1908–12.

BY A. B. RENDLE, D.Sc., F.R.S.

(Continued from p. 303.)

ACQUISITIONS, 1910.

The following additions have been made to the collections by presentation:—36 specimens of European plants from C. E. Salmon; 36 European roses, from Rev. E. S. Marshall; 5 specimens of *Calligonum* from Central Asia, from Dr. Litwinow; 11 specimens from Asia Minor, from R. Campbell Thompson; 101 phanerogams and 17 cryptogams from Sherbro Island, Sierra Leone, from Mrs. C. B. Hunter; 102 specimens from Rhodesia, from E. C. Chubb; 355 specimens from Nigeria, from E. Kitson; 41 phanerogams and 3 cryptogams from Mabira Forest, Uganda, from Charles R. Ussher; 25 specimens from Uganda, from Ernest Brown; 60 specimens from Salisbury, Rhodesia, from Dr. Rand; 273 phanerogams and 27 cryptogams from Gazaland, from C. F. M. Swynnerton; 52 specimens from the Libyan Desert, from W. J. Harding King; 665 specimens from Victoria, Mashonaland, from C. F. H. Monro; 2 specimens from South Africa, from Dr. Bolus; 11 specimens of fruits from Queensland, from Miss E. J. Cross-Buchanan; 43 specimens from New Zealand, South Island, and 75 cryptogams from Fiji, from Miss L. S. Gibbs; 110 specimens, including 49 cryptogams from Christmas Island, from Dr. Andrews; 2 specimens of bark from British Columbia, from Rev. E. H. Burgess; 2 cones from California, from Mrs. J. M. Hutchings; 18 specimens of woods and 17 fruits from Tucuman and Salta, from R. Morton Middleton; 2097 phanerogams and 180 cryptogams from Jamaica, presented by the Hon. the Colonial Secretary, Jamaica; 14 specimens of orchids from Jamaica, from Miss Gosset; 30 North American specimens of *Cratægus*, from W. W. Eggleston; 15 specimens of fruits from the West Indies, from the Secretary of the West Indian Committee; 2 specimens of cultivated Jamaica orchids, from Dr. Longstaff; 3 specimens of cultivated orchids, from Sir Trevor Lawrence; 2 specimens of cultivated orchids, from Messrs. Charlesworth & Co.; 2 specimens of cultivated orchids, from Messrs. Stuart Low & Co.; 12 cultivated plants from Chelsea Gardens, from the Curator; 114 dissections of cultivated *Iris* flowers, from W. R. Dykes; seeds of *Manihot dichotoma*, from Messrs. Honey and Thompson; 12 specimens of cultivated plants from Walter Ledger; 2 cryptogams from near Budapest, from Hon. N. C. Rothschild; 245 mosses of Bolivia, from Sir Martin Conway; 56 Canadian algæ, from Prof. John Macoun; 14 marine algæ of Madagascar, from G. Dixon; 81 fucaceous algæ from the French coasts, from Prof. C. Sauvageau; the lichens of the British Antarctic Expedition (1901–4), from the Managing Committee; 320 microscope preparations of *Laboulbeniaceæ*, illustrating his memoir, from Prof. Roland Thaxter; 395 original drawings of diatoms by the late Prof. R. K. Greville, illustrating his types, from J. Paul Rylands; 5 species of mycetozoa from North America, from Miss G. Lister; *Lithothamnia* dredged off Madeira, from R. Kirkpatrick.

The additions to the British Herbarium by presentation have been:—8 specimens, from Prof. A. H. Trow; 111 specimens, from Rev. E. S. Marshall; 163 specimens, from Rev. H. J. Riddelsdell; 131 phanerogams and 7 cryptogams, from G. C. Druce; 24 specimens of dwarf plants from the Downs at Freshwater and Eastbourne, from John W. Love; 3 specimens of *Rosa*, from Rev. Augustin Ley; 12 lichens of Westmorland and Cumberland, from J. A. Martindale; 3 cryptogams, from E. M. Holmes; 3 fungi, from C. E. Hartley Smith; 51 microfungi of Ayrshire, from D. A. Boyd; a new British moss, from Canon H. W. Lett; 2 new or rare British *Hepaticæ*, from W. R. Sherrin; 3 new British *Hepaticæ*, from W. E. Nicholson.

The following additions have been made by exchange of duplicates:—268 specimens from Malaya, from the Curator, Royal Botanic Gardens, Sibpur, Calcutta; 455 phanerogams and 4 cryptogams from Jamaica, from the Director of the Botanic Garden, New York; 246 phanerogams and 3 cryptogams, from the Director, Imperial Botanic Garden, St. Petersburg; 800 phanerogams and 180 cryptogams from Malaya, from the Director of the Botanic Gardens, Singapore; 84 phanerogams and 18 cryptogams from South Africa, from the Director of the Botanic Museum, Zurich; 236 specimens, from the Director of the Herbarium of the Museum d'Histoire Naturelle, Paris; 100 cryptogams, from the Curator of the Botanical Department, Hofmuseum, Vienna.

The principal purchases during the year were:—Herb. Normale

(Dörfler), cent. xlix. and l., from Dulau & Co.; 361 phanerogams and 3 cryptogams from Montenegro, from O. Bierbach; 401 specimens from Southern France, &c., from H. S. Thompson; 50 specimens "Batotheca Europæa," fasc. vii., from H. Sudre; 84 specimens from Balkans, from Adamovic; 224 specimens "Flora exsiccata Japonica," from Takeda; 542 phanerogams and 289 cryptogams from Saghalien, from Rev. U. Faurie; 186 phanerogams and 14 cryptogams "Flora Stiriaca exsiccata," fasc. 15–18, from Hayek; 239 specimens from Senegambia, from Aug. Chevalier; 153 specimens from South Africa, District Kentani, from Miss Pegler; 316 phanerogams and 17 cryptogams from West Africa, from R. Schlechter; 173 phanerogams and 22 cryptogams from Egypt, from J. Bornmüller; 170 phanerogams and 2 cryptogams from Natal and East Africa, from F. Wilms; 1096 phanerogams and 18 cryptogams from Rhodesia, Congo Region and Central Africa, from T. Kässner; 457 phanerogams and 43 vascular cryptogams from Mexico, from C. A. Purpus; 464 specimens from Gulf States, from S. M. Tracy; 636 phanerogams and 130 cryptogams from Malaya, from H. Winkler; and "Salicetum exsiccatum," fasc. iv., from Toepffer; 236 cryptogams from the Philippine Islands, from Elmer; 85 cryptogams, from Middleton; 38 exotic ferns, from Rosenstock; 437 Canadian mosses, from Macoun; 150 mosses of Hanover, from Wehrhahn; 358 mosses, 81 hepatics, and a lichen from India, from Levier; 300 Baltic mosses, from Mikutowicz; 121 Musci Mexicani, from Pringle; 20 North American *Hepaticæ*, from Haynes; 20 lichenes rariores, from Zahlbruckner; 438 hepatics of Japan and 226 lichens of Japan and Saghalien, from Faurie; 50 North American lichens, from Merrill; 50 American algæ, from Tilden; 100 fungi selecti and 40 myxomycetes, from Jaap; 50 fungi imperfecti, from Kabát and Bubák; 25 funghi parassiti, from Briosi and Cavara; 100 fungi Saxonici and 50 fungi injurious to cultivated plants, from Krieger; 50 ascomycetes, from Rehm; 50 ascomycetes and lower fungi, from Wilson and Seaver; 100 micromycetes rariores selecti, from Vestergren; 100 German fungi, from Sydow; 17 British fungi and 8 mycetozoa, from Hartley Smith; 35 new or rare British fungi and 20 microscope preparations, from Miss A. Lorrain Smith; and 400 fungi Columbiani, from Bartholomew.

Among the acquisitions by purchase, special mention should be made of the herbarium of the late Alphonse Boistel, of Paris. This consists of more than 6200 critically named specimens, being the material upon which is based his "Nouvelle Flore des Lichens" (1902).

ACQUISITIONS, 1911.

(1) *By Donation.*

Additions to the British Herbarium have been received from the following donors:—W. Barclay, 6 specimens of Roses; Rev. E. N. Bloomfield, 44 old Suffolk *Muscineæ* from T. G. Cullum's Herbarium; Miss Bray, 3 specimens; H. H. Knight, 2 rare *Hepaticæ*; Rev. Augustin Ley, 213 specimens of British Hieracia; Rev. E. S. Marshall, 115 specimens; Rev. H. J. Riddelsdell, 150 specimens; C. E. Salmon, 26 specimens; J. C. Shenstone, 1000 photographs and negatives of British plants; H. Stuart Thompson, 3 photographs of habitat of *Spartina Townsendi* and 14 specimens; Prof. J. W. H. Trail, 2 specimens of varieties of *Rubus Idæus*; C. Waterfall, 3 specimens from Yorkshire.

The following donations have been made to the General Herbarium:—

Europe.—Eastern and Associated Telegraph Companies, 2 deep-water marine algæ from the Straits of Gibraltar; W. Fawcett, 7 specimens from N. Spain; F. Seymour Haden, a collection of plants principally from Dauphiné; Mrs. Hort, a collection of Alpine and European plants by the late Prof. Hort; C. C. Lacaita, 13 specimens; Hon. N. C. Rothschild, specimens of anemone from S. France.

Asia.—H. N. Dixon, 6 lichens from Kumaon; S. T. Dunn, 15 phanerogams and 3 cryptogams from China; C. H. Hobart, specimen of orchid from Upper Burmah; Dr. H. Takeda, 70 specimens from Japan; T. Kawada, 23 specimens of Formosan woods; Miss Lilian Lyle, 3 ferns and 4 *Muscineæ* from Japan; the Kwantung Government through Mr. Yamawaki, specimens of fruits and seeds, including 2 panel pictures.

Australia.—Miss D. M. Higgins, 150 specimens from South Australia collected by Miss Hussey; R. M. Laing, 50 marine algæ collected in the Kermadec Islands by R. B. Oliver; A. H. S. Lucas, 5 marine algæ from New South Wales and Tasmania.

Africa.—A. F. Broun, 200 phanerogams and 2 cryptogams from Sudan; E. Brown, 3 specimens from Uganda; Liberian Rubber Corporation, 136 phanerogams and 13 cryptogams from Liberia, collected by R. H. Bunting; F. Eyles, 25 phanerogams and 3 cryptogams from Rhodesia; R. Kemp, 2 fungi from Kilimanjaro district; Dr. Karl Kumm, 8 specimens from Central Africa; C. F. M. Swynnerton, 1758 phanerogams and 26 cryptogams from Gazaland; P. A. Talbot, 113 phanerogams, 70 cryptogams, and 15 fruits from South Nigeria.

America.—F. O'Driscoll, 124 specimens of woods from Northern Argentina; Southern Pacific Railway Co., 3 framed photographs of *Sequoia gigantea* and Oregon pine; W. R. Maxon, 4 specimens and 5 photographs of American ferns; Capt. J. F. Parry, 356 specimens of Arctic plants from Parry's Expedition: West India and Panama Telegraph Co., 5 marine algæ from near Puerto Rico and Grenada.

Cultivated Plants.—W. E. Balston, 11 specimens of cultivated orchids; E. A. Bowles, 8 specimens of cultivated *Galanthus*; Chelsea Garden, 68 specimens for exhibition purposes; J. T. Clifton, 3 specimens of cultivated orchids; Director, Royal Gardens, Kew, 19 specimens of cultivated plants for exhibition purposes; James O'Brien, 11 specimens of cultivated orchids.

(2) *By Purchase.*

British Isles.—E. M. Holmes, 37 rare British marine algæ; A. Chatwin, 20 marine algæ of Jersey; Rev. W. Johnson, 40 North of England lichens; Miss A. Lorrain Smith, 22 microscope slides and 54 dried specimens of new or rare microfungi.

Europe.—A. Kneucker, 90 specimens *Gramineæ* and *Cyperaceæ*; A. Hayek, 200 specimens Flora Stiriaca; O. Weigel, 500 specimens Flora Italica and 40 micro-sections of woods; Dulau & Co., Herb. Normale Dorfler, cent. li. and lii.; H. Sudre, 50 specimens Batotheca Europæa; Toepffer, 50 specimens Salicetum exsiccatum; Kabát and Bubák, 50 fungi imperfecti; A Elenkin, 50 Russian lichens; V. F. Brotherus, 100 mosses of Finland; A. Luisier, 25 Lusitanian mosses; V. Schiffner, 150 European hepatics, with descriptive pamphlet; O. Jaap, 50 fungi selecti; Sydow, 100 German fungi; L. Lhomme, 404 algues marines du Finistère, prepared by P. L. and H. M. Crouan; L. Lhomme, 147 collotype photographs—Cladoniarum Icones herbariorum Flœrke, Wallroth, Nægeli et Flotow, prepared by F. Arnold; Fleischer and Warnstorf, 100 mosses of South Europe.

Africa. — R. Dümmer, 52 specimens from South Africa; Scheffler, 147 specimens from Uganda; Zenker, 151 specimens from Cameroons; A. Pegler, 150 specimens from Kentani district; Dinter, 247 specimens from S.W. Africa.

Asia.—R. Schlechter, 175 phanerogams and 76 cryptogams from New Guinea; A. D. Elmer, 275 phanerogams and 125 cryptogams from Philippine Islands; E. Levier, 480 cryptogams collected in the Schen-si Province of China by J. Giraldi.

Australasia.—J. E. Tilden, 85 phanerogams and 84 cryptogams from New Zealand.

America.—W. Broadway, 19 specimens of orchids from Grenada and 206 specimens from Tobago; Reineck, 415 phanerogams and 21 cryptogams, mostly from America; Purpus, 519 specimens from Mexico; Marcus E. Jones, 1245 phanerogams and 40 cryptogams from North Mexico, Eastern California and Montana; Hassler, 1073 specimens from Paraguay; Fiebrig, 1088 specimens from Bolivia; Baron von Türckheim, 195 phanerogams and 53 vascular cryptogams from Santo Domingo; W. Harris, 22 specimens of *Cyperaceæ* and *Gramineæ* from Jamaica; Collins, Holden, and Setchell, 100 North American algæ; G. W. Wilson and F. J. Seaver, 50 ascomycetes and lower fungi; C. G. Pringle, 100 Mexican mosses; E. Bartholomew, 200 fungi Columbiani; A. Brinkman, 125 mosses and 52 hepatics of British Columbia; G. K. Merrill, 75 lichens, mostly North American.

General. —V. Schroeder, 104 tropical ferns determined by E. Rosenstock; H. Rehm, 60 ascomycetes; Sydow, 50 *Uredineæ* and 25 *Ustilagineæ*; A. Zahlbruckner, 20 lichenes rariores.

(3) *By Exchange of Duplicates.*

Director, Botanic Gardens, Singapore, 1452 specimens of Malayan plants; Dr. De Wildemann, 30 specimens from the Congo; Director, National Herbarium, Sydney, 50 specimens and 5 fruits from Western Australia and 15 specimens from N.S. Wales; the Government Botanist, Victoria, Australia, 32 specimens from Western Australia; Director, Botanic Gardens, Zürich, 158 phanerogams and 3 vascular cryptogams from South Africa, collected by R. Schlechter; Director, Royal Botanic Gardens, Calcutta, 54 specimens of Sikkim plants; Dr. R. Schlechter, 61 specimens of orchids from Sumatra; the Imperial Botanic Gardens, St. Petersburg, 930 phanerogams and 36 cryptogams from Manchuria and Korea, collected by Komarov.

(To be concluded.)

SHORT NOTES.

Rynchospora fusca (p. 295).—I gathered a few specimens on Burtle Moor, near Shapwick Railway Station, Somerset, as late as July, 1888, just over a century after Sole recorded it. This was several years before the Thos. Clark Herbarium came into my possession, and disclosed finer specimens from the same district. My find was recorded, with other plants, in Journ. Bot. 1889, p. 183. It was quoted in Murray's *Flora of Somerset*, and Mr. White's *Flora of Bristol* (1912), but apparently the plant disappeared very soon after 1888, probably owing to the cutting of the peat, for no one has since seen it. It is somewhat strange that *R. fusca* does not increase more, on account of its elongated rootstock or above-ground creeping stolons. This is one of the chief points of distinction from the commoner *R. alba*, which has no stolons. Some of the wet, sandy heaths in Dorset, adorned in August with Bog Asphodel and Marsh Gentian, might very possibly reveal this rare species growing with the other, which is common there. Clark recorded the two growing together in Somerset, and so did Arcangeli in Italy. In his *Flora Italiana*, ed. 2 (1894), p. 77, he says: "Con la precedente [*R. alba*], ma più scarsa." *R. alba* is given as "non frequente" in Northern and Central Italy. Not only are the habitats of the only two European species of *Rynchospora* very similar—so similar that they sometimes grow together—but, excepting the British Isles, the known distribution of both species throughout the world seems to bear a remarkable analogy. As far as I have been able to gather, however, *R. fusca* is much rarer in nearly all the European countries where they both occur. —H. Stuart Thompson.

—— The county of Dorset was accidentally omitted from my notes on this species: "Originally gathered near the Isle of Purbeck, Dorsetshire, by the Rev. Mr. Lightfoot, according to a specimen in the herbarium of the Rev. Mr. Hasted at Bury. Mr. John Denson." Smith, *English Flora*, i. p. 290 (1828). The species is not infrequent in four of the botanical divisions of the county (Mansel-Pleydell, Fl. Dorset, p. 290 (1895)).—Arthur Bennett.

Isle of Wight Plants (p. 286).—With reference to the remarks on *Fumaria*, it may be well to point out that the number of species described in *Fumaria in Britain* is not thirty-six, as Mr. Stratton states, but ten, of which one only is new. Mr. Stratton's number, taken from my index, is the total of the British species with all their subdivisions and hybrids; and as, by a curious coincidence, the corresponding number of *Fumaria* names in Rouy & Foucaud's *Flore de France*, v. i. (1893), is likewise thirty-six, and the same number of species, as I reckon them, inhabits both countries, it may be said that my paper has brought our knowledge of the genus approximately to the level reached in France twenty years ago. I would add that, in the British vice-comital distribution which I gave under each species, the Isle of Wight is duly credited with such plants as it is known to possess, and I think few others are likely to be added to the list. *F. micrantha* and *F. Vaillantii* were rejected as insufficiently vouched for. To see Fumitories in variety it is necessary to go beyond the Isle of Wight to some of our Western districts where, as in the Riviera and other parts of France, they occur in great beauty and profusion, and form a conspicuous feature of the flora. It may be of interest to note that I received this summer, from Miss R. M. Cardew, fresh examples of the *Orobanche* growing on *Eryngium* at St. Helen's Spit, and found on examination that it was not *O. amethystea* Thuill., as recorded in the *Flora of Hants* for that locality, but typical *O. minor* Sm., identical in every respect with the ordinary form of Surrey clover-fields. Miss Cardew arrived independently at the same conclusion, and, I think, believes that no other form occurs on the Spit.—H. W. Pugsley.

Potamogeton trichoides in Scotland.—Among some specimens of the genus sent me by Mr. J. R. Matthews from the parish of Dunning, Perthshire, there is a sheet of the above species. Although there is no flower or fruit, the habit and leaves, &c., of the plant are unmistakable. This is its first record for Scotland, its nearest locality in England being at Hempstead-cum-Eccles in N. Norfolk (Mennell *sp.*).—Arthur Bennett.

West Lancashire Extinctions.—We regret to state that, owing to recent drainage operations on a large scale, the whole of the lowland moor or peat bog known as Cockerham Moss has been quite altered in character, and no ground now remains in an aboriginal condition. The following plants, which formerly had here their only West Lancashire station, have entirely disappeared and must be deleted from the flora of v.-c. 60:—*Drosera anglica* Huds., *Carex limosa* L., *Sphagnum riparium* Angstr., *S. fuscum* Klinggr., *S. obtusum* Warnst., *Kantia submersa* Arnell, and *Cephalozia Loitlesbergeri* Schiffn.—J. A. Wheldon and A. Wilson.

Hepatics new to Wales. — *Cesia corallioides* (Nees) and *Anthelia Juratzkana* Limpr., these two rare alpine hepatics, were collected on the summit of Snowdon, August, 1912, when I had the pleasure of visiting it in company with Messrs. Duncan, Ingham, Jones, and J. C. Wilson.—W. H. Pearson.

Sagina procumbens L., forma.—The notes upon this in Journ. Bot. 1912, 288, and 1913, 103, call to my notice some specimens, obviously this pretty "double" state, sent me in 1911 by Miss H. M. Salmon from Barcombe, Sussex. It had attracted notice by its conspicuous white flowers, with petals longer than sepals, and rock-gardeners might do well with it in cultivation. In *Phytologist*, iii. 1000 (1850) the same form was recorded from Staffordshire.—C. E. Salmon.

REVIEW.

Report for 1912 of the Botanical Exchange Club. Vol. iii. Part. iii. by the Secretary (June, 1913): Part iv. by the Editor and Distributor, JOHN CRYER (August, 1913). Price 3*s.* 6*d.* each. Oxford: Blackwell.

THE earlier of these two parts is entirely the product of Mr. Druce, and contains a great variety of material, some of which is of considerable interest. Besides the "Plant Notes for 1912, etc.," there is a section devoted to "Botanical Publications, 1912," containing a list of the publications of the year and of such papers in periodicals as Mr. Druce considered worth notice—Mr. Pugsley's Monograph of *Fumaria* and other important papers published in this Journal find no place. Obituary notices of Alfred Fryer A. O. Hume, W. W. Fowler (adapted from this Journal), Thomas Hilton, John Piquet, and George Maw—whose death last year we omitted to notice—are followed by "new county and other records" from various sources, mostly of Mr. Druce's own observation and including a large number of aliens. We note incidentally that Mr. Druce queries the identity of *Linum bienne* Mill. with *L. angustifolium* Huds. (see Journ. Bot. 1912, 246), although he gives no reason for his doubt. "Vide spec." is attached to many of the records, but we find no explanation of this.

The Report has for frontispiece a "new species" of *Lepidium*, which is described by Dr. Thellung (who ought to know) as *L. peregrinum*; the figure represents a wretched specimen, with hardly an indication of inflorescence, found by Miss Hayward, with other species, on the too famous rubbish-heaps at Galashiels, and supposed to be from Australia. If the figure adequately represents the material on which the species (which is described at great length) is based—and if it does not, we do not know why it is given—we think most botanists will hesitate before accepting it. Aliens abound in the Report, but we do not propose to mention them here. Three pages are devoted to *Rosa Rothschildii* Druce—a plant which the describer has "associated with the name of my friend on whose estate it grows"; it also occurs over a considerable tract of country. The plant known as *Sedum acre* (Auct. Brit. non aliorum) is described by Mr. Druce's "distinguished friend Prof. Graebner"—who says it "belongs to quite a large number of forms endemic in Britain"—as *S. Drucei.*

Taraxacum balticum Dahlstedt has been found by Mr. Druce in Oxfordshire: a hybrid between *Linaria purpurea* and *L. repens*, which came up in Mr. Druce's garden, is described and named × *L. Dominii.* The *Plantago montana* of Hudson, which has been generally referred to *P. maritima*, is named by Mr. Druce, who considers it "a distinct race," *P. Hudsoniana.* There are some interesting notes on forms of *Chenopodium album* by "my friend Dr. Murr, the well-known expert on this genus," the exact status of which it is not quite easy to ascertain; among them several new names seem to have been secured. Two of Dr. Carl Lindman's splits from *Polygonum aviculare*, with numerous varieties, are described; there is also a hybrid—*P. æquale* × *calcatum* Lindm.—found by Mr. Druce in Buckinghamshire; this "assumes the presence" of the latter, which has not been found in the county. Another addition to our Flora is *Poa irrigata* Lindm., to which four pages are devoted. A good example of enthusiasm for the creation of new names is afforded by *Asplenium lanceolatum* var. *Sinelii*; of this a single plant was found in Jersey by Mr. Sinel, who has never, after repeated search, seen it again; the record is based on a note by J. F. Robinson in *Science Gossip* for 1880. When the variability of *A. lanceolatum* is remembered, it seems hardly justifiable to bestow a name upon a plant which only occurred once, is only known from a descriptive phrase, and has not been seen by the namer.

It will be seen from this brief summary that this part of the Report—the opinions in which, Mr. Druce tells us, are "purely personal, and necessarily in no way carry the authority of the Club"—contains matter the value of which can only be appreciated by those who are acquainted with the plants indicated or described. We are however sure that, viewed from a literary standpoint, it would gain greatly by condensation.

The second part of the Report is by Mr. John Cryer, the "editor and distributor" for the year, and may be described as corresponding with the earlier Reports of the Exchange Club before it became, under Mr. Druce's secretaryship, a "Society of the British Isles." The notes, contributed as usual by our leading British botanists, are full of interest, though at times they present differences of opinion which seem more puzzling than helpful: for example, that on the plant sent in by Mr. Druce as *Ranunculus peltatus* var. *penicillatus*, which Mr. Groves says is "not in the least like" *penicillatus*, and doubts its being referable to *peltatus*, and the sender promises to "collect again." Mr. Bailey says that *Sisymbrium pannonicum* is extending at St. Anne's-on-Sea, where it has been known for many years, and has an interesting note on the changes in the vegetation of the Lancashire sand dunes. Mr. C. E. Britton notes an interesting form of *Papaver Rhœas*, which he thinks may deserve a name, but with commendable reticence is in no haste so to distinguish; he thinks that *P. Rhœas*, as restricted by Rouy & Foucaud, is an uncommon plant.

There is indeed throughout the Report a gratifying absence of new combinations, though one or two seem to have slipped in, and of new names—one of the latter, however, appears under *Juncus bufonius*, of which Mr. G. C. Brown—a recent accession to the Club—has a "forma *altissima*," as to the novelty or distinctness of which other contributors express doubt. Another contributor whose name is new to us is Mr. D. Lumb, who has interesting notes on *Poa Chaixii* and *Lolium temulentum*.

In many ways this part of the Report seems of unusual interest; the notes on representatives of certain genera—among which may be mentioned *Viola*, *Spergularia*, *Erodium*, *Rosa*—there is little about *Rubus*—*Cratægus*—we note that Mr. Marshall thinks that "too many slight varieties are alleged"—*Epilobium*, *Hieracium*, *Anagallis*, *Euphrasia*, *Mentha*, *Salicornia*, *Polygonum*, *Ulmus*, and *Potamogeton*—are numerous, and must not be overlooked by workers. We are glad to note that Mr. Cryer speaks well of the specimens sent in; these reached the unprecedented total of 8656—a gratifying indication that the interest in British botany is not diminishing.

BOOK-NOTES, NEWS, &c.

In 1909 an interesting note was published in the *Tokyo Botanical Magazine* by Mr. M. Tahara, on the liberation of oogonia in species of *Sargassum*, as the result of his studies at the Misaki marine biological station. In this note he gives his opinion that the liberation of oogonia in *Sargassum* "takes place simultaneously, not only for a given plant but also for all plants of the same locality"; and he further states that "this simultaneous liberation proceeds in fortnightly crops on a particular day, with a fixed interval after the highest spring tide, the interval varying, however, in different species." Owing to the relative shortness of time during which he was able to study these phenomena, Mr. Tahara returned later to Misaki and renewed his observations on *Sargassum enerve*, *S. Horneri* and *Cystophyllum sisymbrioides*. His results are published in the *Journal of the College of Science, Tokyo* (vol. xxxii. 1913, art. 9, 13 pp. 3 plates), where he shows that, although the intervals between the two corresponding liberations in *Sargassum enerve* and *S. Horneri* are tolerably constant, the intervals between two successive liberations is quite irregular; for example, in *S. enerve* it may be 5, 6, 9, 10 or 11 days, and therefore bears no fixed relation to the highest spring tide. A study of each species shows the same result. Thus the phenomena of the liberation of oogonia in *Sargassum* and *Cystophyllum* differ from those in *Dictyota dichotoma*, in which species their relation to the highest spring tide is an established fact. The author goes on to describe the different modes in which the oogonia are liberated in *Sargassum Horneri* and in *Cystophyllum sisymbrioides*, and the part played in each by the paraphyses. In discussing the early stages of embryogeny, the author alludes to Miss Simon's paper on *Sargassum filipendula*, in which she states that the three successive nuclear divisions before oosphere formation, common to Fucacia, are suppressed in that species. He paid special attention to this point in species of *Sargassum* and *Cystophyllum*, and he finds the oogonium development quite normal. The development of the sporelings in these genera is described in detail.—E. S. G.

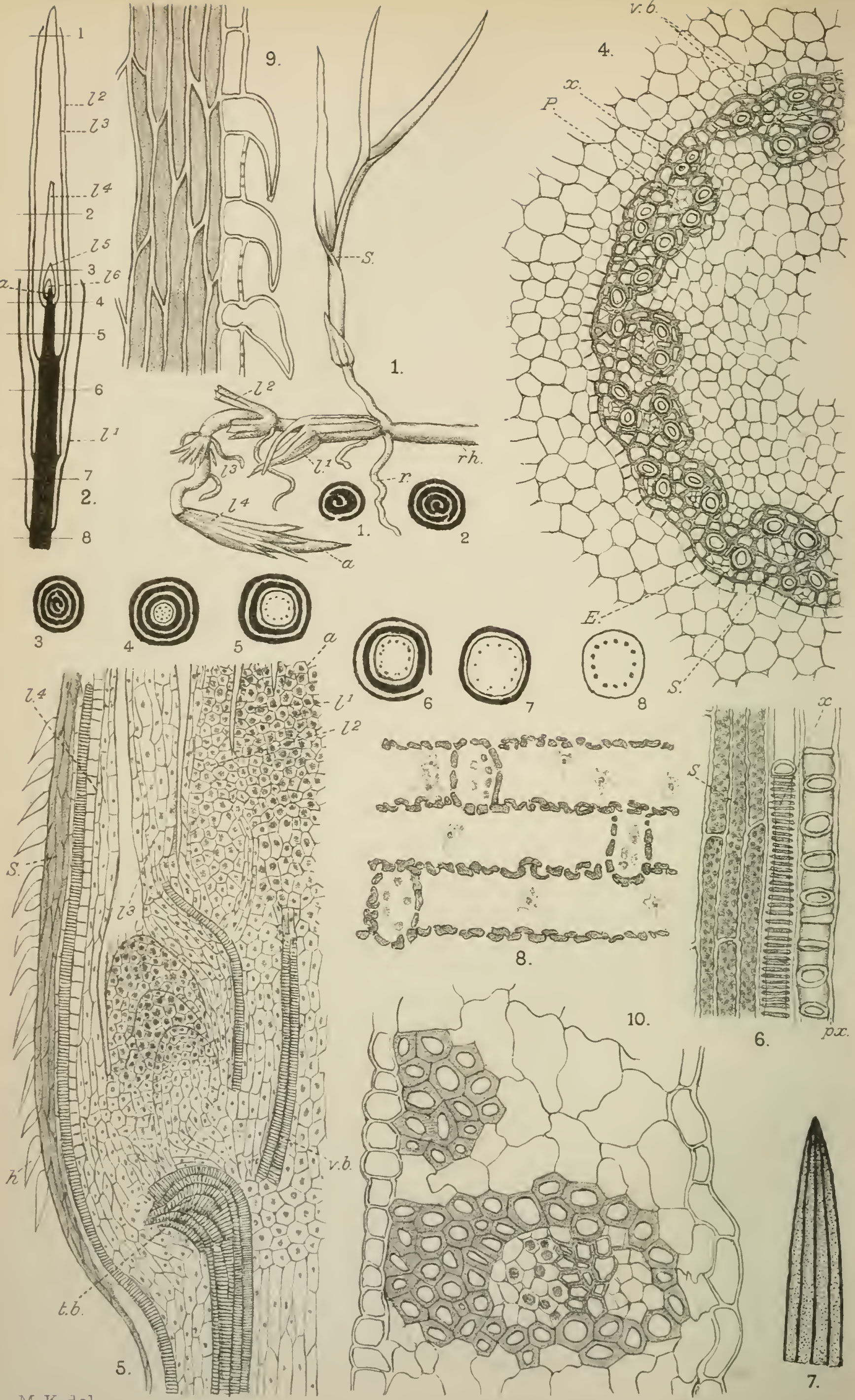
The *Journal of the Royal Horticultural Society* for August (xxxix. pt. 1) contains the papers read at the Primula Conference held in April last. These include Dr. John MacWatt's paper on "European Primulas," Mr. Reginald Farrer's on "Primula Hybrids in Nature," and Prof. Balfour's on "Chinese Species of

Primula"—this last illustrated by a large number of beautifully produced figures, and including a complete list of the species with synonymy and valuable notes on the various sections; these are followed by notes on other Asiatic and an American Primulas, and by "Notes on Himalayan Primulas," by Mr. W. Craib, who describes at length two new species, *P. Walshii* and *P. Smithiana*, and raises to specific rank *P. petiolaris* var. *sulphurea*, *P. petiolaris* var. *Stracheyi* (as *P. Drummondiana*), and *P. minutissima* var. *spathulifolia*.

The last number (xli. 283, Oct. 6) of the *Journal of the Linnean Society* (Botany) contains a paper on the morphology and histology of *Piper Betle*, by Mr. H. M. Chibber, with three plates; an account of the plants collected on the Carruthers-Miller-Price Expedition through North-west Mongolia and Chinese Dzungaria in 1910, by Messrs. M. P. Price and N. D. Simpson, with figures and descriptions by the latter of six new species; and a paper on the structure of the wood of East Indian species of *Ficus*, by Messrs. Percy Groom & W. Rushton, with two plates.

The *Kew Bulletin* (No. 6, August) contains a list of the Fungi additional to those already recorded as occurring in Kew Gardens. These include the following new species, all of which are described and figured by Mr. Massee: *Laccaria nana*, *Omphalia kewense*, *Glœsporium Crotalariæ*, *Colletotrichum concentricum*, *Brachysporium Wakefieldiæ*, *Stemmaria æruginosa*, *Arthrosporium elatum*. From No. 7 of the same journal (September) we learn that the Wallichian Herbarium has been transferred from the Linnean Society to Kew. A history of the herbarium, with the commentary upon Wallich's localities and numbers which the late C. B. Clarke drew up and left in MS. at Kew, accompanies the account of the transference.

The annual autumn foray of the British Mycological Society was held at Haslemere on September 22nd–27th. About fifty mycologists attended the excursions, which were to Charlton Woods, Woolmer Forest, and Rodborough Common. Over four hundred of the larger fungi were found, and about fifty Myxomycetes. Mr. A. D. Cotton gave the presidential address, on "Some Suggestions as to the Study and critical Revision of certain Genera of the Agaricaceæ." Mr. F. T. Brooks gave an account of his cultures of Ascomycetes and Basidiomycetes. Mr. A. H. R. Buller described his researches on the analysis of the hymenium, and Mr. J. Ramsbottom gave some notes on the history of the classification of the Discomycetes. Professor Buller was elected President for the ensuing year. The spring foray of 1914 is to be held at the Forest of Dean, and the autumn foray at Doncaster. The Cryptogamic foray of the Essex Field Club will be held on Nov. 8 at the Loughton and Theydon Bois districts of Epping Forest. The leaders will be: for Mosses, Messrs. H. N. Dixon, L. B. Hall, and W. R. Sherrin; for Hepatics, Mr. E. M. Holmes; for Lichens, Miss Lorrain Smith and Mr. R. Paulson; for Myxomycetes, Miss Gulielma Lister.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M.K. del.
P. Highley lith.

West, Newman imp.

Agropyrum repens L.

THE CREEPING ROOTSTOCK OF AGROPYRUM REPENS.

By MARGERY KNIGHT, M.Sc.
Assistant Lecturer in Botany, University of Liverpool.

(PLATE 528 A.)

Agropyrum (*Triticum*) *repens* L., commonly known as couch or scutch grass, has been described as the worst weed of cultivation. This undesirable title has been given to the plant on account of the difficulty of extirpating it when once it has taken possession of the soil. The plant is a perennial, and its branching rootstock forms a dense underground tangle or mat, giving off roots below and aerial shoots above.

The branches of the rootstock end in sharpened apices, which are perfectly rigid, and being pressed forward by intercalary growth of the internodes behind make an excellent boring apparatus. It is quite common to find potatoes transfixed by the rhizome. The forward movement of the sclerotic apices raises the question of the distribution of meristem and its transformation into permanent tissue, and Professor Harvey-Gibson suggested to me that it might be worth while to determine precisely the distribution of growth in the shoot apex and the exact nature of the boring apparatus.

Careful dissection shows that the apex consists of a bud, the leaves of which are inrolled to form a tube; the tip of the outermost leaf forms the hard point, and within it follows a series of successively smaller leaves until the actual merismatic stem apex is reached within the youngest leaf (fig. 2). Growth of the second oldest leaf and elongation of the internode below it force the apex through the sclerotic tip of the outer covering leaf (fig. 2). This takes place successively with the progressive development of the shoot; the older leaves becoming more and more ragged and torn, until, finally, they may be represented on an old stem by jagged ridges only. No sclerenchyma is developed in the leaf until it has almost reached full size and is ready to break through the older covering leaf. The bands of sclerenchyma run longitudinally, and are laid down over and alternately with the vascular bundles. These ribs converge to the tip of the leaf, where they form the sclerotic boring point. While this development of sclerenchyma is taking place, sharp, backwardly-directed hairs grow out from special epidermal cells; these are perfectly rigid and, acting like barbs on a fish hook, resist any attempt to tear the plant out of the ground (fig. 9).

Structure of stem.—In transverse sections the stem shows a central pith, which is more or less destroyed in the internodal regions, surrounded by a double ring of bundles of which the smaller are externally placed. A fairly thick cortex surrounds the vascular tissue; possibly the aggregation of the sclerotic cells into a ring as near the centre as possible is an adaptation to the kind of strain which an underground stem would have to with-stand. The bundles show the usual monocotyledonous structure: one or two protoxylem elements; two metaxylem vessels; and a patch of phlœm, consisting of sieve tubes and companion cells. The bundles are united into a cylinder by sclerenchyma, and the skeletal tissue is surrounded by an endodermis with well-marked thickenings on the radial walls (fig. 4). A longitudinal section of the stem shows that both the proto- and metaxylem elements have annular thickenings, the first-formed elements being recognisable by the wide spacing of the rings (fig. 6). The walls of the sclerotic cells also are covered with very fine pits, which are absent from the sclerotic cells developed in other places; this seems to suggest that they form accessory water-conducting elements.

Structure and development of the leaf.—Each leaf is closely adherent to the stem through one internode. It then becomes free, but remains tubular for about half or two-thirds of its remaining length. There are on an average eight or nine bundles in each leaf, each bundle consisting of a small group of xylem cells (3–8) and a somewhat larger group of phlœm cells, with a large patch of sclerenchyma towards the outside; smaller interfascicular patches of sclerenchyma also occur. The outer surface of the leaf in the young condition shows an epidermis with curiously irregular walls—probably due to incomplete thickening; the cells are of two sizes, long and narrow cells alternating with very short ones (fig. 8). The latter give rise to the backwardly-directed hairs to be found in the older leaves. As one would expect in an underground stem, there are no stomata and no palisade tissue, the ground tissue of the leaf being made up of loose parenchyma without chlorophyll.

Origin of leaf.—A longitudinal section passing through the apex shows leaves in all stages of development. An incomplete arc of merismatic tissues appears just below the actual apex; this grows rapidly, forming a sheath which is not quite complete. Later, the merismatic arc at the base of the sheath becomes a complete ring, and the remainder of the leaf is tubular. A longitudinal section, such as that figured (fig. 5), shows the two innermost leaves, consisting entirely of rapidly-dividing cells; the third leaf bears signs of differentiation, its cells are usually elongated, particularly those towards the outside where the sclerenchyma and vascular tissue will be laid down. The internode also shows a strand of delicate elongated tissue leading up into, and continuous with, the elongated cells of the leaf, forming the procambium of the vascular cord. The internode below the fourth leaf shows a xylem strand which is continuous with one in the leaf itself, and a more fully developed strand nearer to the centre of the stem. The fifth leaf shows all the characters of a completely developed organ. In many cases buds are developed in the axils of leaves; and there is usually a great development of tracheal tissue immediately below, connected to the bud by strands of elongated cells (fig. 5).

Origin of roots.—The roots arise endogenously from the under side of the nodes, usually in pairs, and just behind the point of origin of a leaf. There is nothing in their appearance, structure, or mode of origin which calls for comment.

Explanation of Plate 528 a.

Fig. 1. *Agropyrum repens* L. (nat. size). rk = rootstock; r = root; a = sclerotic apex; 1′..1″ scale leaves; s = erect shoot. Fig. 2. Longitudinal section, growing apex, × 4, semidiagramatic, showing growing apex (a) and successive leaves (1–1^5). Fig. 3. 1–8 successive sections taken at the levels indicated in fig. 2, 1–8. Fig. 4. Transverse section of stem internode. v.b. = vascular bundle; x = xylem; p = phlœm; e = endodermis; s = sclerenchyma. Fig. 5. Longitudinal section, showing several successive leaves and the growing apex (a). a = apex; 1^1 1^2 1^3 1^4 = successive leaves; v. b. = vascular bundle; t. b. = tracheal bed; h = hairs; s = sclerenchyma (× 450). Fig. 6. Longitudinal section of vascular bundle, showing px = protoxylem; x = xylem; s = pitted sclerenchyma (× 450). Fig. 7. Leaf apex, showing arrangement of bands of sclerenchyma (× 4). Fig. 8. Epidermis of leaf showing alternate long and short cells whence barb hairs arise. Fig. 9. Longitudinal section of outer layers of leaf showing sclerenchyma and barb hairs. Fig. 10. Transverse section of leaf showing vascular bundle and sclerenchyma (× 450).

HELLEBORINE VIRIDIFLORA IN BRITAIN.

By J. A. Wheldon, F.L.S., and W. G. Travis.

On p. 307 we announced the discovery of *Helleborine viridiflora* (*Epipactis viridiflora* Reichb.) on the Lancashire coast, and are now in a position to give further particulars of this addition to the British Flora.

In the field-work which is being undertaken in connection with the preparation of a Flora of South Lancashire, we have devoted much attention to the study of the sand-dune flora; and, during the past summer more especially, considerable attention has been paid to the orchids, a dozen species of which are recorded in the local lists as occurring on the sandhills of the South Lancashire coast.

An orchid which seemed particularly to call for critical examination was a plant hitherto referred by local botanists to *Helleborine latifolia* Druce. We had long thought it differed considerably in appearance from the inland plant in some not readily definable way, but until last summer had never compared fresh examples of *H. latifolia* with the dune plant, or made a critical examination of the latter. This comparison of flowering specimens was rendered a matter of some difficulty by the fact that, when the coast plant was in flower, the inland plant was only in bud, and, by the time the flowers of the latter were sufficiently developed, we found it difficult to get flowering examples of the coast plant, and had to pay several visits to different localities before securing a few belated blooms.

The result of our comparisons led us to the conclusion that the dune plant was certainly not ordinary *H. latifolia*, and, in fact, it did not seem to agree with anything described in British

Floras. It seemed, however, to be very near to *Epipactis viridiflora* Reichb., as described in Lloyd & Foucaud's *Fl. de l'Ouest de France*, p. 342; and the remark of these authors—"Facile à distinguer par sa fleuraison qui a lieu lorsque l'épi de celui-ci (*E. latifolia*) commence à se former"—was also very suggestive of our plant.

Fresh examples were accordingly collected and sent to Mr. R. A. Rolfe, who kindly compared them with authentic specimens of *E. viridiflora* Reichb., and confirmed our determination of the dune plant. He informed us that, so far as he could see, our plant agreed completely with the specimens of *E. viridiflora* at Kew.

The synonymy, followed by a description based on our examples from the Lancashire sandhills, is as follows:—

HELLEBORINE VIRIDIFLORA, comb. nov.
Epipactis viridiflora Reichb., Fl. exc., p. 134.
E. macropodia β viridiflora Peterm., Fl. Bien., p. 31.
E. latifolia All. *β viridiflora* Irm., in Linnæa, 16, p. 451 (1842).
Serapias viridiflora Hoffm., Deutschl. Fl. 1, p. 182.
S. latifolia β silvestris Pers., Syn. 2, 512 (1807).

Plant less robust than *H. latifolia* or *H. violacea*, with a more slender and wiry stem. *Rhizome*, slender, far-creeping. *Stems*, solitary, 2–5 dcm. high, almost glabrous below, with short pubescence above; base deeply tinged with violet-purple. Lower *sheaths*, several, amplexicaul, often rather loose; the uppermost slightly funnel-shaped. *Leaves*, of a fresh yellowish-green; almost all completely embracing the stem, arcuate, and with a tendency to fold conduplicately; lower and intermediate ones elliptic-lanceolate, the upper linear-lanceolate, acuminate, usually few and distant. *Flowers*, yellowish green in colour, without any trace of purple or rose, in a lax few-flowered raceme, shortly pedicellate, the lower ones exceeded by the bracts; smaller, less inclined, and opening earlier than in *H. latifolia*. *Label*, whitish-green, triangular-cordate, acuminate, entire or slightly irregular at margin, straight, or but slightly recurved at apex; with two low slightly wrinkled basal bosses or hunches, separated by a median space. *Hypochile*, very ventricose, with white, strongly reflexed anterior margins. *Germen*, large in proportion to the size of the flower, glabrous, or with a few, scattered, soon deciduous hairs.

Flowering period, from mid-June to end of July.*

The other British species of *Helleborine* to which *H. viridiflora* is most nearly allied are *H. latifolia*, *media*, and *violacea*, its closest affinities being with the two first. No difficulty will be experienced in separating it from *H. violacea* (*Epipactis purpurata* Sm.). The large, widely-open flowers of the latter, white and tinged with purple internally, are far handsomer than the inconspicuous greenish ones of *H. viridiflora*. The label in both species is very similar, if not identical, in shape and size; but in *H. viridiflora* there is never a linear median hunch as in *H. violacea*. In the colour of the stem and foliage the fresh yellowish-green of the dune plant contrasts strongly with the colour of *H. violacea*, which is of a grey-green, suffused with purple. Apart from other distinctions already mentioned, *H. viridiflora* may be readily separated from all forms of *H. latifolia* by the smaller size and different colour of the flowers, and especially by the form of the label. This in *H. viridiflora* is as long as broad, and gradually tapers to an acute point, which is frequently not at all recurved; whereas in *H. latifolia* the label is always broader than long, and terminates in a recurved apiculus. From *H. media* Druce, which seems to cover a number of forms, some of which are, perhaps, not always separable from *H. latifolia*, *H. viridiflora* is, perhaps, less easily distinguishable. We have not had the advantage of fresh examples of *H. media* for comparison, but basing our comparisons on authentic dried material and descriptions, *H. viridiflora* is separable from *H. media* in the following respects: Its flowers are smaller, although arranged in a similar lax raceme. In habit it is usually even more slender and wiry-looking than *H. media*, with narrower leaves, and the flowers, greener and less conspicuous, are devoid of that purple tinge, some trace of which is usually present in *H. media*. In this latter the germen is slender in comparison with the thickness of the flower-buds and flowers, and tapers gradually into the pedicel. In our examples of *H. viridiflora* the germen and the flower-buds are nearly equal in size, both as regards length and thickness. The germen of the unopened flowers is as long as, and often somewhat exceeds, the length of the flower (*i.e.*, the length of the sepals), and approximates thereto in thickness; it also rapidly narrows into the short pedicel. In this respect the following measurements may be cited as average ones for the dune plant:—Uppermost flower-buds: germen (not including pedicel) 8 mm. long, bud (from top of germen to tips of sepals) 7 mm. Fully open flower: germen 10 mm. long; flower 9–10 mm. Lowest flower of raceme: germen 12–13 mm. long × 6 mm. in diameter. The dune plant, by reason of the lax, few-flowered racemes of small greenish little-expanded flowers, with the relatively large and thick germens, has a distinct facies of its own.

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* Camus (Mon. Orch. Eur.), who puts the plant as a sub-species of *Epipactis latifolia*, says it flowers a month earlier than the type.

In our examples, *H. viridiflora*, as compared with its nearest congeners, has a comparatively small amount of pubescence; and this is particularly noticeable in the case of the germen, which is practically glabrous. In *H. latifolia*, *media*, and *violacea*, also, the upper surface of the nerves of the leaves is covered with minute but distinct asperities. These are very faint and hardly visible on the leaves of *H. viridiflora*.

We are satisfied that *H. viridiflora*, as we know it from the Lancashire dunes, is quite distinct and separable from all the other British species of the genus. On the Continent it seems to be sometimes confused with greenish-flowered examples of *H. latifolia* and the var. *virescens* of *H. atropurpurea*. Any deficiency of purple coloration in the flowers of *H. latifolia* and its allies is usually attributed to the influence of deep shade. As against this, it is a noteworthy fact that the flowers in our dune *Helleborine viridiflora* have no purple tinge at all, although they are fully exposed to sunshine, growing, as the plant does, on the open dunes.

The flowers seem to contain a much smaller quantity of nectar than do those of *H. latifolia* and other species of *Helleborine* which we have seen. This, in conjunction with the greenish, less open character of the flowers, and an early and rapid swelling of the ovary, seems rather suggestive of self-fertilization. We may mention that Mr. Rolfe independently suggested that the plant looks like a self-fertilizing form. This is a point which calls for further investigation. We have made no observations as to insect visitors, but we may mention that on one occasion we found, on a single plant, the dead bodies of two different species of Diptera, the heads of which had, in some fashion, got entrapped in the throat of the flowers. One belonged to an insect-eating genus, and the other was not identified.

H. viridiflora occurs widely scattered on the sand-dunes from Hall Road, in South Lancashire (v.-c. 59) to South Shore, in West Lancashire v.-c. 60), and in some places it occurs in fair quantity. Its special habitat is the low secondary dunes built up by *Salix repens*, and it does not usually occur, either in the wetter part of the dune valleys, or on the more elevated and drier marram-clad dunes. Last summer it was in flower on June 20th, and its flowering period was practically over by the end of July, as in the first week of August we found it difficult, as above stated, to collect flowering specimens.

We have not troubled to get details as to the Continental distribution of *Helleborine viridiflora*, but have consulted a few of the Floras relating to coastal areas.

In Lloyd and Foucaud's *Fl. de l'Ouest de France*, *H. viridiflora* is stated to occur in sandy woods on the coast. Buchenau, in *Fl. Ostfries. Inseln* (1881), p. 134, records *Epipactis latifolia* as occurring on "bewachsenen Dunen" in the various islands, and on Norderney in "Dunenthäler in der Mitte der Inseln." *E. latifolia* is recorded on the inner dunes of the coast of Holland; and in the Dutch islands of Ameland, &c., it is found in "duinpannen" with *Salix repens* (Holkema, *De Plant. Neder. Noordzeeelanden*). It is possible that some of these dune plants may also prove to be *H. viridiflora*. It is certain, however, that *H. viridiflora* is by no means a littoral plant, as according to Rouy it is disseminated over a wide area in the interior of France.

We desire to express our indebtedness to Mr. R. A. Rolfe; also to Messrs. Albert Wilson, H. Adair, C. E. Salmon, and C. R. Ritchings, for sending us fresh specimens of various species of *Helleborine*; and also to Mr. A. Bennett for references to some of the literature cited.

NOTE ON ACCOMMODATION IN POLYGALA VULGARIS

By Lilian Baker, M.Sc.

This species of *Polygala* is distinguished by the possession of crowded lower leaves, oval in shape, and scattered upper leaves, alternate and lanceolate. The raceme is always terminal and the calyx wing is as broad as the fruit. The crowding of the lower leaves and the alternating of the upper are usually sufficient to distinguish it from *P. serpyllacea* Weihe. The equality of breadth in wing and fruit distinguish it from *P. oxyptera* Reichb.

It is commonly assumed to be limited in occurrence to meadows, pastures and heathy places. The following table, compiled from the lists in the *Types of British Vegetation* and similar sources, contrasts its habitat and, wherever possible, its frequency with those of the allied species.

P. vulgaris.	*P. serpyllacea.*	*P. oxyptera.*
Chalk, abundant.	Drier siliceous ground, frequent.	Chalk grassland, local.
Neutral grassland, occasional.	*Nardetum* (siliceous), less abundant.	
Grass heath on sand, frequent.	*Calluna* moor, occasional.	
Calluna heath (Scottish).	*Nardetum* (grass moor), frequent.	
Limestone grassland, abundant.	Subalpine grassland.	
Chalk grassland (dyke), abundant.	Chalk grassland, absent.	

Bentham & Hooker attribute to *P. oxyptera* habitats in dry, sandy, and rocky places; its distribution appears, however, to be very imperfectly known (*vide* Journ. Bot. 1913, p. 241).

The occurrence of *P. vulgaris* in a bog near Felin Hen, three miles south of Bangor, suggests that its heath habitat must be extended to include damp heath and lowland moor; the peculiarities of its habit led to the observations and measurements given below.

For purposes of comparison specimens were obtained in June, 1913, from the grounds of the Old College, Bangor, where they were found to be growing with much *Anthoxanthum adoratum*, *Poa pratensis*, *Deschampsia flexuosa*, *Holcus mollis*, *Trifolium repens*, *Veronica Chamædrys*, *Potentilla erecta*, *Hypnum* spp. This heath-like association had attained a height of 15 cm.

Other specimens were obtained from a sloping meadow, facing south, near Felin Esgob, near Bangor; others from the lower northern slopes of Carnedd Dafydd, the height of the grass in these cases being about 8 cm. and 5 cm. respectively.

The peculiarity of these forms when gathered in June is the rosette habit (fig. 1). Specimens taken from the same places at the end of September and beginning of October show a much more irregular and diffuse type of branching.

The rosette was not formed immediately at the base of the stem, but at a short distance above it.

The specimens obtained from the garden gave slightly larger dimensions than the others, twenty from each locality being selected for examination and measurement. The garden ones gave the following measurements:—

Average length of flowering shoot	12 cm.
Number of shoots to each plant	2–6.
Distance of rosette from base	2–7 cm.
Average length of main root	5 cm.

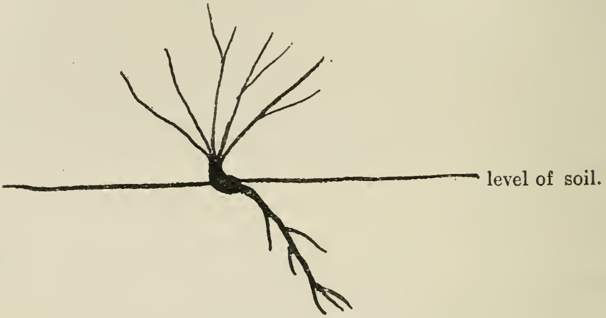

Fig. 1.—Heath type.

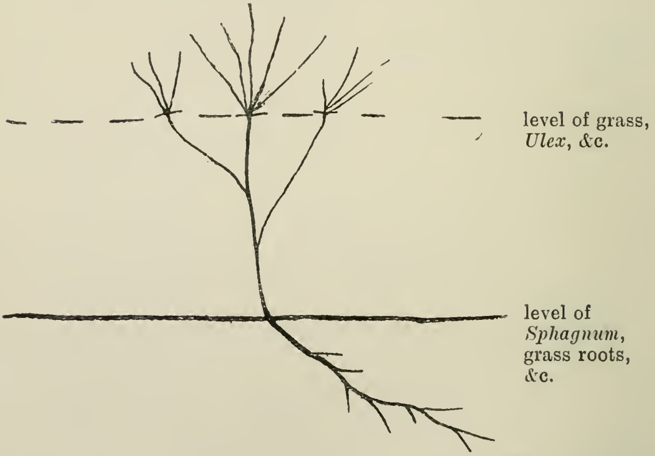
level of grass, *Ulex*, &c.
level of *Sphagnum*, grass roots, &c.

Fig. 2.—Bog type.

The basal, unbranched portion of the stem is rarely erect, usually procumbent. The crowded leaves which occur about the portion where branching takes place are oval, ·5 cm. in average length.

The upper lanceolate leaves, ·5–1 cm. in length, occur alternately with an average distance of 1 cm. between them.

The root system consists of a main root, branched near its apex, and closely invested by a mat of grass rootlets, moss rhizoids, &c.

All the leaves are of the light green, herbaceous type, produced by the shading of surrounding grasses.

The more branched forms, *i.e.*, with more numerous branches in each rosette, spread out their branches, pressing the grasses away and obtaining access to light and air for themselves.

The bog form (fig. 2) occurs on the drier parts of an old peat bog. Turf has been cut and deep trenches formed. These have filled up with water and the whole area re-colonized by plants, so that the whole is almost levelled and path-way can only be found along the tops of old banks.

The wet parts contain *Menyanthes trifoliata, Equisetum limosum, Hypericum pulchrum, Sphagnum* spp., *Juncus conglomeratus* and *articulatus, Eriophorum angustifolium*, &c. The drier parts contain *Eriophorum vaginatum, Oxycoccus quadripetala, Narthecium Ossifragum, Erica Tetralix, E. cinerea, Calluna vulgaris, Molinia cœrulea, Scirpus cæspitosus, Nardus stricta, Vaccinium Myrtillus*, and *Ulex europæus*. Here, growing through the wet tufts of *Sphagnum*, drier tufts of *Juncus conglomeratus* and bushes of *Ulex europæus*, the *Polygala vulgaris* is found.

Its root system is similar to that of the meadow form, though exceeding it in average length by 3 cm. (average of twenty specimens). It is entwined among the lower layers of the still living *Sphagnum* and the roots of grasses, never penetrating deeply.

Almost immediately above the root, the stem branches repeatedly give rise to 3–8 thin, etiolated shoots, with small, ovate, often subopposite leaves. These shoots are supported by the grasses and shoots through which they grow till they reach air and light. Here they again branch, forming the rosettes of small, ovate leaves, as in the meadow form, but with larger lanceolate leaves scattered among them. Above this rosette, which rests on cross branches of *Ulex* or the upper layers of grass, the plant entirely resembles the meadow form, except that the specimens which are not shaded by surrounding vegetation develop a distinct purple tint on stem and leaves, especially on midrib and leaf margins. In some lower leaves the chlorophyl is completely masked by the purple coloration.

The flowers resemble those of the meadow form, except that the latter have more chlorophyl coloration in their three smaller sepals.

In the bog form these sepals are slightly paler than the two wings, but are only faintly tinged with green in the very young stage.

Twenty plants were examined and measured in the field, and ten more in the laboratory; from these thirty bog forms the following measurements were obtained :—

	Heath.	*Meadow.*	*Bog.*
Average length of shoot	10 cm.	12 cm.	20 cm.
Number of shoots to each plant . .	2–7	2–6	2–15
Distance of point of branching from base	—	—	2–6 cm.
Distance of rosette from base . . .	2–5 cm.	2–7 cm.	6–15 cm.
Average length of main root . . .	5 cm.	5 cm.	8 cm.

Of the specimens contained in herbaria in Bangor two were completely described. One collected by Dr. J. Lloyd Williams from Garn Dolbenmaen in the month of June was of the heath type, but with a very strong rosette of over twenty branches, the portion below the rosette being thickened and rhizomic in appearance, procumbent, and tapering. Another obtained by the author from the Goyt Valley, Buxton, was of the marsh type, with elongated lower portion of succulent stem and few branches. It was, however, taken in August.

The above observations have led to the transplanting of these forms into different conditions to test their stability.

The variability of any species might be roughly estimated as proportional to the number of varieties assigned to it by a systematist of the "splitter" type; that of a genus would, similarly, be proportional to the number of species allotted.

The view is now commonly held that, given a sufficient knowledge of the conditions to which a plastic genus is subjected, a series of species and varieties might be postulated and described correlated with these conditions. It appears, however, that all combinations of the different affective factors, whether edaphic or epidaphic, are not stable, except, perhaps, momentarily; that is to say, a complete and continuous series of such factors acting on a given species could not be compiled, even if reliable data from all parts of the world were available.

The interaction of climatic and edaphic factors does, however, give rise to definite "adaptations" in the genus and "accommodations" in the species (see Massart's *Le Rôle de l'Experimentation en Géographie Botanique*, 1912). These may be considered as the response to definite "resultants" between the affective factors. When these resultants are widely divergent in quantitative and directive action, specific differences are caused and may become fixed and hereditary. When the divergence is slight, differences of varietal range are induced, some of which may be stable and eventually become fixed; others remain modifiable, giving rise to local variations.

The plant may be said in Massart's phrase to "adapt" itself to widely divergent resultants, and to "accommodate" itself to those of lesser divergence.

JUNCUS BALTICUS Willd. IN ENGLAND.

By R. S. Adamson, M.A., B.Sc.

In May, 1913, I discovered *Juncus balticus* growing in moderate quantity in a damp hollow on the sandhills, locally known as a "slack," near Southport, Lancashire. The plant occurs in some hollows that are permanently damp but not really swampy. It occurs in association with such plants as *Sagina nodosa* var. *monilifera*, *Parnassia palustris* var. *condensata*, *Anagallis tenella*, *Erythræa littoralis*, *Blackstonea perfoliata*, *Juncus articulatus* var. *littoralis*, *Scirpus setaceus*, *Carex panicea*, *C. Œderi*, *Equisetum variegatum*, and others, together with several bryophytes, notably *Bryum ventricosum*, *B. calophyllum*, *B. intermedium*, and *Pellia calycina*.

In October of this year I again visited the locality, this time in company with Mr. J. A. Wheldon and Mr. W. G. Travis, and a systematic hunt was made of the neighbouring dune-hollows, with the result that *J. balticus* appears to be very local in its distribution and, though occurring in some quantity where it does occur, to be confined to the one series of dune-hollows in the fixed dunes where it was first discovered. In these places it appeared perfectly native and there seemed no reason to look on it as an introduction.

J. balticus is a species with a moderately wide distribution; it occurs in both North and South America, extending from Canada to Mexico and California, and in South America in the more temperate parts of Chili and Patagonia. It is absent from the Tropics. It also occurs in Asia, from the Behring Sea to Japan. In Europe it occurs on the coasts of the north-west part. It is known from the coasts round the North Sea, being found in Norway, Sweden, Russia, North Germany, Denmark, Holland, and also in the Faroe Islands and Iceland, but not in France or Belgium. A very closely allied species, or possibly only a variety, *J. pyrenæus*, occurs on the Pyrenees. In the British Isles it has been found on sandy coasts, from Fifeshire northwards, up the east coast of Scotland, and on the west coast, from Sutherland and the Hebrides. It has not been reported for Ireland. Thus the present record marks a distinct extension of the range of the species in North-West Europe, and a new record for England.

J. balticus has also been reported from New Caledonia, but not elsewhere in the Australasian region.

J. balticus belongs to the section of the genus with erect stems, with the leaves all basal and, in most cases, reduced to sheaths, a pseudolateral inflorescence, with the subtending bract cylindrical and apparently forming a continuation of the stem. *J. balticus* and its nearest allies are further distinguished in having the stem quite smooth, not ridged as is the case in *J. effusus*, &c., due to the fact that the subepidermal strands of fibres are here quite absent. *J. balticus* has a creeping, not cæspitose, rhizome with considerably elongated internodes. The inflorescence is many-flowered and regularly branched, the branches being elongated and ending in few-flowered drepania. The perianth segments are all acute. The fruit is triseptate and equals or exceeds the perianth; it is mucronate and somewhat pyramidal at its apex.

The closely allied *J. arcticus*, which occurs in Arctic Europe and Asia, and on the Alps, differs in having the inflorescence branches very short, the inner perianth obtuse, and the fruit obtuse and mucronate and distinctly exceeding the perianth.

J. pyrenæus has the perianth segments unequal, and all sharply acuminate and considerably exceeding the fruit.

J. balticus has been divided into several varieties. That which occurs in North-West Europe is var. *europæus* Engelm., which differs from the varieties *mexicanus*, *columnaris*, and *montanus*, which occur in America, and from var. *japonicus* in Japan, in having very short stamens, about half as long as the perianth segments, with the anthers about equalling the filaments, and from var. *Hænkei* (Japan, &c.), which also has short stamens, in the lanceolate perianth segments, all nearly equal in length, which are slightly shorter than the mucronate capsule.

COMMEMORATION OF THREE ESSEX NATURALISTS.

Rather more than a year ago Mr. Miller Christy noticed that the tombs of John Ray and his friend and medical adviser, Dr. Benjamin Allen, in Black Notley churchyard stood in need of some repair and that there existed no memorial of their friend and neighbour, Samuel Dale, of Braintree, author of the *Pharmacologia* and editor of Taylor's *History of Harwich.* He accordingly got up a subscription for these purposes, and the completion of the work was celebrated by a joint meeting of the Essex Field Club and the Braintree Educational Society at Black Notley and Braintree on April 27th, 1912, at which the restored tombs were inspected, a bronze memorial tablet to Dale was unveiled in Braintree Parish Church, and a eulogy on the three naturalists was delivered in the High School by Professor Boulger, a Past President of the Essex Field Club, who has given considerable attention to the lives of Ray and Dale. This eulogy, which incorporates various biographical details that have come to light since Professor Boulger published his life of Dale in this Journal for 1883 (pp. 193 *sqq.*), has now been published in the *Essex Naturalist*, as has also a "First and Final Report" on the Commemoration Fund by Mr. Christy. This latter is illustrated by five plates, *viz.* the tombs in Notley churchyard; a view of Dewlands, John Ray's home, taken shortly before it was burnt in 1900; the Dale Memorial Tablet; the Portrait of Ray in the National Portrait Gallery; and that of Dale at Apothecaries' Hall. Both portraits were photographed direct from the originals; and it is interesting to observe how, owing to the liberties taken by the engravers, the portrait of Dale, of which an autotype accompanied Professor Boulger's memoir in 1883, differs from the photograph from the same original, which, by the courtesy of Mr. Christy and the Essex Field Club, we reproduce as frontispiece. In the engraving the hat was omitted, as were also the backs of the two books to the left of the figure, whilst the expression is far more stern and forbidding. The present is altogether a more pleasing presentment.

Both Professor Boulger's eulogy and Mr. Christy's Report contain a good deal of matter of biographical interest. It appears, for instance, that the Jesus Chapel of Braintree Church, in which

SAMUEL DALE

[*See p. 352*

the Dale Memorial Tablet is placed, was for many generations partitioned off and used as a school, so that it was in that very spot that Ray received his education before going to Cambridge.

REPORTS OF DEPT. OF BOTANY, BRITISH MUSEUM, 1908-12.

By A. B. Rendle, D.Sc., F.R.S.

(Concluded from p. 335.)

Acquisitions, 1912.

(1) *By Donation.*

Additions to the British Herbarium have been received from the following donors:—H. N. Dixon, 34 microscope slides of prehistoric mosses; G. C. Druce, 59 specimens; W. Fawcett, 5 specimens; C. P. Hurst, 3 specimens; Rev. E. S. Marshall, 91 specimens; W. E. Nicholson, 2 specimens; Prof. D. Oliver, 50 specimens; Rev. H. J. Riddelsdell, 105 specimens; C. E. Salmon, 20 specimens; H. S. Thompson, 3 specimens; Major A. H. Wolley-Dod, 258 specimens of roses and 49 specimens of *Mentha.*

The following donations have been made to the General Herbarium:—

Europe.—Miss D. Bates, 10 specimens from Majorca; Dr. Beille, 4 specimens of *Fumaria* from Herb. Clavaud; Dr. M. C. Cooke, 27 microscope slides of freshwater algæ; M. A. Fenton, 3 specimens from Spitzbergen; Miss D. M. Higgins, 227 specimens from South of Spain; A. B. Jackson, 9 specimens from La Mortola.

Asia.—A. Adiassewick, 63 specimens from Turkestan; Prof. A. Arnoldi, 7 algæ from Aru Islands; C. J. Brooks, 5 ferns from Sarawak; J. R. Drummond, 193 specimens from India; Rev. Prebendary H. E. Fox, 718 phanerogams and 11 ferns from Palestine, collected by B. T. Lowne; H. French Ridley, 130 specimens from Ko-ko-Nor, N.W. China.

Africa.—Miss Armitage, 2 specimens from Egypt; G. L. Bates, 23 specimens from South Cameroons; Rev. Prebendary H. E. Fox, 147 phanerogams and 45 ferns from the Canary Islands, also 42 ferns from Madeira, collected by H. B. Tristram; W. J. Harding King, 36 specimens from Libyan Desert; A. E. Kitson, 102 phanerogams, 2 cryptogams, and 4 fruits from South Nigeria; Liberian Rubber Corporation, 169 phanerogams and 3 cryptogams from Liberia, collected by R. H. Bunting; Miss O. MacLeod, 138 *Cyperaceæ* and *Gramineæ* from North Nigeria, North Cameroons and Lake Chad district; J. O'Brien, 3 orchids from Uganda, collected by J. Hughes; Hon. W. Rothschild, F.R.S., specimen and drawing of *Cynomorium coccineum,* and 3 photographs of Terebinth taken near Laghouat, Algeria; Mr. and Mrs. P. A. Talbot, 1551 phanerogams, 50 cryptogams, and 98 fruits from North Nigeria, North Cameroons, Lake Chad district and Oban, South Nigeria.

Australasia. — W. V. Fitzgerald, 12 specimens from West Australia, collected by M. Kock; Miss L. S. Gibbs, 51 *Hepaticæ* from New Zealand; Miss A. Henley, 3 specimens of Kauri gum, 1 palm, and 46 ferns from New Zealand; R. Kirkpatrick, 7 cryptogams from Christmas Island; Dr. W. J. S. Lockyer, 27 specimens from Late Island, near Vavau, "Eclipse Expedition."

America.—A. Bennett, 58 phanerogams and 18 cryptogams mostly from America; Colonial Secretary, through the Director of Agriculture, Jamaica; 92 specimens from Jamaica; Sir W. Martin Conway, 1135 specimens from Bolivia, collected by R. S. Williams; Dr. M. C. Cooke, 8 fungi mostly from North America; Miss B. M. Gosset, 3 orchids from Jamaica; R. H. Howe, 11 mosses from Newfoundland; and specimen of *Bacopa* from Dr. N. L. Britton.

Cultivated Plants. — A. Berger, specimens of cultivated *Mesembryanthemum*; E. A. Bowles, specimen of cultivated *Aster Falconeri*; Chelsea Physick Garden, 32 specimens for exhibition purposes; Prof. C. V. Piper, 20 specimens of cultivated *Mucuna*; J. T. Winkworth, abnormal flowered specimen of bee orchis.

General.—Rev. D. Lillie, 50 *Hepaticæ*, mostly tropical.

(2) *By Purchase.*

British Isles.—W. A. Davis, 35 lichens from Cambridge, prepared by C. du Bois Larbalastier; C. E. H. Smith, 21 specimens of prepared fungi; B. Corfe, 7 drawings of fruits of British *Umbelliferæ.*

Europe.—Dörfler, Herb. Normale, cent. liii. and liv.; O. Jaap, 100 fungi selecti and 20 myxomycetes; Kabát and Bubák, 50 fungi imperfecti; A. Kneucker, 29 specimens of Carices; K. W. Krieger, 50 fungi Saxonici; J. Mikutowicz, 200 Baltic mosses; V. Schiffner, 50 European hepatics; J. Schiller, 30 Adriatic algæ; H. Sudre, 50 specimens Batotheca Europæa and 50 specimens Hieracia; Sydow, 100 German fungi and 25 phycomycetes and protomycetes; A. Toepffer, 50 specimens Salicetum exsiccatum; Tranzschel and Serebrianikow, 200 Russian fungi; T. Vestergren, 50 micromycetes rariores selecti; T. O. Weigel, 400 specimens Erbario Crittogamico Italiano, 50 mosses of Finland, prepared by V. T. Brotherus, and Flora Italica, cent. xiii. and xiv., including 21 microsections of woods, prepared by A. Fiori and A. Béguinot.

Asia. — J. Bornmüller, 84 Persian plants, collected by T. Strauss; A. D. E. Elmer, 922 phanerogams and 188 cryptogams from the Philippine Islands: U. Faurie, 109 lichens from Japan and Corea; F. Wilms, 611 phanerogams and 50 cryptogams from China, collected by A. K. Schindler.

Africa.—J. Gossweiler, 556 phanerogams and 82 cryptogams from Angola; T. Kassner, 106 specimens from Katanga, Central Africa; A. Pegler, 100 specimens from Kentani district; Rev. F. A. Rogers, 190 specimens chiefly from Rhodesia and Belgian Congo; F. Wilms, 352 phanerogams and 6 vascular cryptogams from Natal, collected by H. Rudatis.

Oceania.—U. Faurie, 1130 phanerogams and 1168 cryptogams from the Sandwich Islands; J. E. Tilden, 58 phanerogams and 81 cryptogams from the South Pacific Islands.

America.—E. Bartholomew, 200 fungi Columbiani and 200 *Uredineæ*; T. S. Brandegee, 459 phanerogams and 21 cryptogams collected in Mexico by C. A. Purpus; Collins, Holden and Setchell, 125 North American algæ; C. C. Haynes, 20 American hepatics; R. B. Hough, 25 specimens of American woods; G. K. Merrill, 75 lichens, mostly North American: W. F. Rosenberg, 90 ferns from Peru, collected by C. O. Schunke; I. Urban, 247 phanerogams and 35 cryptogams from St. Domingo, collected by H. von Türckheim.

General.—M. A. Miedbrodt, 100 marine algæ; H. Rehm, 66 ascomycetes; E. M. Reineck, 340 phanerogams and 153 cryptogams; V. Schroeder, 85 tropical ferns, determined by E. Rosenstock; Sydow, 100 *Uredineæ* and 25 *Ustilagineæ.*

(3) *By Exchange of Duplicates.*

Director, Royal Botanic Museum, Berlin, 1082 phanerogams and 68 cryptogams from tropical Africa and 47 phanerogams and 3 cryptogams from Caroline Islands; Director, Royal Botanic Gardens, Calcutta, 91 specimens from India; Director, Royal Gardens, Kew, 21 specimens of *Pedicularis* from North-west India; Director, Botanic Garden, New York, 414 phanerogams from Cuba and 159 mosses and 168 *Hepaticæ* from North and South America; Director, Herbarium, Museum of Natural History, Paris, 681 phanerogams with 151 drawings, and 77 vascular cryptogams, mainly Chinese; Director, Imperial Botanic Gardens, St. Petersburg, 25 specimens from Turkestan; Director, Botanic Gardens, Singapore, 387 phanerogams and 91 cryptogams from Malay Peninsula; Director, National Herbarium, Sydney, 13 specimens of *Eucalyptus*; Curator, Botanical Department, Hofmuseum, Vienna, 200 cryptogams, mostly European; W. A. Davis, 269 specimens of British Hieracia.

BIBLIOGRAPHICAL NOTES.

LIV.—'The Botany of the Antarctic Voyage.'

In making the preliminary announcement of his son's great work, Sir W. J. Hooker, in his *London Journal of Botany*, (iii. 274, 1844), thus summarized its intended scope:—"The publication . . . is to appear in monthly parts till the whole is completed in 5 vols. royal quarto with 500 beautifully executed lithographic plates of new or imperfectly known species; coloured and plain. . . . Each part [is to contain] 8 plates and 2 sheets of closely printed letter-press. . . . No. 1 of the *Flora Antarctica* will appear on the 1st of June of the present year and will be completed in 20 parts with 160 plates. . . . The *Flora Novæ Zelandiæ* will form 1 vol. with 140 plates, and will be succeeded lastly by

Part iii., *Flora Tasmanica*, or the *Botany of Van Diemen's Island*, in 2, or probably 3, volumes, illustrated with 200 plates." The publication extended over a period of sixteen years, and, as is not uncommon in works of this magnitude, certain modifications in the scheme were found necessary during its progress through the press; the numbers did not appear regularly and were not uniform in extent. The present note is an attempt to supply information as to the contents of each number and approximate date of issue.

I.—Flora Antarctica.

The dates of the receipt of the numbers of the *Flora Antarctica* by the Linnean Society are given by Dr. Daydon Jackson in this Journal for 1912, p. 285, but his information as to the contents of each number is inaccurate. To obtain correct details, I have searched contemporary literature with very fair success; the only chance of further results seems to be in finding a copy in its wrappers as issued. The first number, which according to Hooker (*Lond. Journ. Bot.* iv. 30 (1845)), was published on 1 June, 1844, contained the summary of the voyage (pp. i.–xii), chart of the South Circumpolar regions, pp. 1–16, and plates 1–8; it is reviewed at length in the *Annals of Horticulture* for 1846, p. 135, and by Lindley in the *Gardeners' Chronicle* for the same year, p. 446. The latter review, which is very outspoken in its criticism of the lack of botanical results from former expeditions, was printed by the publisher of the *Flora* on the wrapper of No. 2 without consulting Hooker. This caused Hooker much annoyance; he gave instructions for a new wrapper to be issued, and at the same time attempted to secure the return of those copies already sent out. The criticism was of course levelled at Robert Brown, and in an apologetic letter to him, now in this Department, Sir W. J. Hooker, under date 2 August, 1844, explains his son's endeavours to dissociate himself from any sympathy with the reviewer's remarks.

The date of receipt of several of the sheets is indicated in the British Museum copy; pp. 17, 33, 49, and 65 are all marked "44.10.7," *i. e.* 7 Oct. 1844; p. 81, "44.12.3"; p. 93, "44.12.31"; p. 113, "45.12.3"; that the foregoing is a correct record of the contents of the several numbers is substantiated by Hooker (*l. c.*), and by a passage in the *Botanische Zeitung*, iii. 568:—Theil 1–8; Jeder Theil enthält 2 Bogen Text u. 8 lith. Taf." The first part concluded with p. 208, the second continuing with p. 209. The following sheets of this part are dated in the copy at Bloomsbury; p. 257, "46.4.6"; p. 301 [*bis*], "46.9.15"; p. 349, "47.2.1"; p. 397, "47.9.3"; p. 429, "47.2.29." Pritzel, *Thesaurus*, ed. 1, 123 (1847), gives the contents of Nos. 1–14 as pp. xii. 272, tt. 1–112, and this is confirmed by a notice in the *Gardeners' Chronicle*, 1846, p. 135. It appears from *Ross's Voyage*, ii. 261, that p. 385 occurred in No. 22.

In Sir Joseph Hooker's letters to M. J. Berkeley, now in this library, I have found confirmatory evidence for the following tabulated record. One of these letters explains the increased size of the later numbers. Sir Joseph, writing from Kew under date 3rd September, 1844, says:—"I will tell you what I am doing, and that is, all I can to let the Cryptogamic portion of each flora be contained in numbers *per se.* Thus Auckland & Campbell Isl. will be in 3 numbers with 24 plates, other Antarctic probably the same or a little more, say 4." The cryptogamic numbers were duly issued, some copies in continuation of the parent work, others with a separate pagination and with the title *The Cryptogamic Botany of the Antarctic Voyage.*

Part i.—*Botany of Lord Auckland's Group and Campbell's Island.* London, 1847.

No. 1	=pp. i.–xii. 1–16	tt. 1–8 and chart;		June 1, 1844.
,, 2	,, 17–32	tt. 9–16	before	July 4, 1844.
,, 3	,, 33–48	,, 17–24	,,	Aug. 16 ,,
,, 4	,, 49–64	,, 25–32	,,	Oct. 14 ,,
,, 5	,, 65–80	,, 33–40		
,, 6	,, 81–92	,, 41–48	,,	Dec. 2 ,,
,, 7	,, 93–112	,, 49–56	,,	Jan. 4 1845.
,, 8	,, 113–144?	,, 57–64	,,	Mar. 25 ,,
,, 9	,, 145?–184	,, 65–72		
,, 10	,, 185–208, dedication and tt. 73–80;			May, 1845.

Part ii.—*Botany of Fuegia, The Falklands, Kerguelens Land, &c.* London, 1847.

No. 11	=pp. 209–224	tt. 81–88	before	Oct. 7, 1845.
,, 12	,, 225–240	,, 89–96		Nov. 1, 1845.
,, 13	,, 241–256	,, 97–104	before	Dec. 4, 1845.
,, 14	,, 257–272	,, 105–112 [?107 bis & ter]	before	Feb. 2, 1846.
,, 15	,, 273–288	,, 113–120	before	Mar. 2, 1846.
,, 16	,, 289–304	,, 121–128	,,	April 4 ,,
,, 17	,, 301bis-316	,, 129–136	,,	May 5 ,,
,, 18	,, 317–332	,, 137–144	,,	June 1 ,,
,, 19	,, 333–348	,, 145–152	,,	Aug. 1 ,,
,, 20	,, 349–364	,, 153–160	,,	Nov. 3 ,,
,, 21	,, 365–380	,, 161–168	,,	Dec. 5 ,,
,, 22	,, 381–396	,, 169–176	,,	Jan. 1, 1847.
,, 23	,, 397–428	,, 177–184	,,	Feb. 2 ,,
,, 24	,, 429– ?	,, 185–192	,,	May 3 ,,
,, 25	,, ? –574	,, 193–198	,,	Oct. 2 ,,

II.—FLORA NOVÆ ZELANDIÆ. III.—FLORA TASMANIÆ.

A note on the dates of these was contributed by Dr. Daydon Jackson to the *Bulletin de l'Herbier Boissier* in 1893 (i. 299), and was reprinted in this Journal for 1909, p. 106. The allocation of parts and dates there given is, however, inaccurate, and should be replaced by the following. The dates of the numbers are taken from the copy in the British Museum (Bloomsbury), which contains most of the original wrappers with the date of receipt stamped on each and on many of the plates; the years are added from the wrappers.

Flora Novæ Zelandiæ.

Part i.—*Flowering Plants.* London, 1853.

No. 1	=pp.	1–80	tt.	1–20	(1852)	received	July 2, 1852.
,, 2	,,	81–160	,,	21–40	,,	,,	Sept. 2 ,,
,, 3	,,	161–240	,,	41–60	,,	,,	Feb. 17, 1853.
,, 4	,,	241–312	,,	61–70	,,	,,	Dec. 6 ,,
	Introductory essay=pp. i.–xxxix., title and half-title.						

Part i.—*Flowerless Plants.* London, 1855.

No. 5	=pp.	1–80	tt.	71–90	(1854)	received	May 2, 1854.
,, 6	,,	81–160	,,	91–110	,,	,,	July 3 ,,
,, 7	,,	161–272	,,	111–130	(1855)	,,	Feb. 13, 1855.
,, 8	,,	273–378, title & half-title (1855)				,,	

Flora Tasmaniæ.

Vol. i.—*Dicotyledones.* London, 1860.

No. 1	=pp.	1–80	tt.	1–20	(1855)	received	Nov. 5, 1855.
,, 2	,,	81–160	,,	21–40	,,	,,	May 7, 1856.
,, 3	,,	161–240	,,	41–60	(1856)	,,	Dec. 2 ,,
,, 4	,,	241–320	,,	61–80	(1857)	,,	Aug. 6, 1857.
,, 5	,,	321–359	,,	81–100	(1856)	,,	Dec. 3 ,,

Vol. ii.—*Monocotyledones and Acotyledones.* London, 1860.

No. 6	=pp.	1–80	tt.	101–120	(1857)	received	July 1, 1858.
,, 7	,,	81–160	,,	121–140	(1858)	,,	Sept. 9, ,,
,, 8	,,	161–240	,,	141–160	,,	,,	Mar. 3, 1859.
,, 9	,,	241–320	,,	161–180	,,	,,	Aug. 18 ,,
,, 10	,,	321–422	,,	181–200	(1860)	,,	Feb. 6, 1860.
,, 11	,,	i-cxxviii, 1–18, titles & half-titles (1860).					

F. G. Wiltshear.
British Museum (Nat. Hist.).

LV.—MIQUEL'S 'PLANTÆ JUNGHUHNIANÆ.'

The date of publication of Miquel's *Plantæ Junghuhnianæ* is not printed in the work, but is usually stated as 1851–55; but as a great many new species were published in it, it may be useful to give the actual years in which each of the four fascicles appeared. From Wikström's *Ars-berätt.* 1851–52, p. 133, and 1853–54, p. 125, it appears that the four parts were issued as follows:—

Pp.	1–98	(Fasc. i.)	1851.
,,	99–270	(Fasc. ii.)	1852.
,,	271–394	(Fasc. iii.)	1854.
,,	395–end	(Fasc. iv.)	1855.

S. T. Dunn.

A NOTE ON LOCAL LISTS.

By the Editor.

The paper on the Flora of Denbighshire, issued as a Supplement to this Journal and concluding with our present issue, suggests a few reflections which we think it well to print for the guidance of those who may be good enough to send us similar preliminaries to a Flora—which, we may add, we are always glad to receive. The contribution in question was printed under a misapprehension; it had been returned to the author on the understanding that it would be materially reduced in bulk before going to press, and on that understanding the Editor had given instructions for its publication. His absence from England prevented him from seeing the first instalment in proof; and that being printed off, it was of course necessary that the remainder should correspond with it.

In the first place, it is entirely unnecessary (at any rate in a preliminary list) to quote every station from which a plant common throughout the county has been recorded. To take an example, the localities for *Malva moschata* occupy eighteen lines in Mr. Dallman's first list and nine in the second. This would be excessive even in a complete Flora, and is certainly redundant in preliminary lists; examples of this superfluity are evident on almost every page of the lists. Again, there seems no advantage in such doubtful records as that under *Radicula amphibia* (p. 7); entries of this kind were eliminated from the later portions of the list, and this is only cited as an example of things to avoid.

With regard to the citation of names of contributors, this of course is an act of courtesy which should on no account be omitted; but it cannot be necessary to indicate after each locality for a common plant the initials of the person who found it there —still less to give two authorities, as is often done in the Denbighshire lists. We can quite understand that folk like to have due credit for their observations, but it seems hardly necessary to record that they found a daisy or a buttercup in a given locality, and still less that two of them did so. A general acknowledgement in the prefatory remarks and special mention in the case of interesting species is all that any reasonable person can require—at any rate, in a scientific publication. There is always an ample outlet in local papers for folk who like to see their names in print. In the Denbighshire lists such acknowledgement is duly made in the preface, and it seems unnecessary to print on every page many times the initials of those whose help has been thus recognised.

In a preliminary list of the extent of those in question, some indication of districts or some grouping of localities should be given for the benefit of those unacquainted with the county. If this were done, the needlessness of multiplying entries of definite localities would at once become obvious.

We have felt it necessary to make these remarks because we know that we have been criticised for printing the Denbighshire papers at such length, and we are bound to admit that the criticism is just. We can only say that we put the points raised above before the author of the lists, and that, as we have explained, we had hoped they would have obtained more attention than they received. The later portions have been somewhat abridged in order that the paper might be brought within the limits of this year's Journal.

We need not say that we are always most grateful for lists or records of British plants, and that the aim of the Journal is, as it has always been, to afford a medium of communication between British botanists.

It is also desirable that more care should be exercised before entering a plant as a "new record" for a county or district. It is impossible that the Editor should check such entries, but it is not unreasonable to expect a local worker to do so. That this is often insufficiently done, the complaints we receive—often from those who are themselves not without blame—abundantly shows.

SHORT NOTES.

Plants epiphytic upon Palms at Hyères (p. 135).—Long before my note on this subject was published my friend Mr. Raine, of Hyères, had studied the question and sent a list to the *Annales de la Soc. d'Hist. nat. de Toulon*, but we agreed not to compare notes. His article, " Hôtes des Phœnix dactilifera d'Hyères," was delayed, and published after my own. The list, which is in no apparent order or sequence, and, curiously, rather shorter than my own, contains twenty-seven names of plants not in mine. Eleven of them are composites, viz. *Helminthia echioides*, *Carduus pycnocephalus*, *C. tenuiflorus*, *Chondrilla juncea*, *Lactuca Scariola*, *Sonchus arvensis*, *S. maritimum*, *Conyza ambigua*, *Crepis diffusa*, *Picridium vulgare*, and *Pterotheca nemausensis*. The others are *Fumaria capreolata*, *F. parviflora*, *Cheiranthus Cheiri*, *Pistacia Lentiscus*, *Cercis Siliquastrum* (probably my "woody shrub with round, entire, smooth leaves"), *Rhamnus Alaternus*, *Acanthus mollis*, *Borago officinalis*, *Veronica didyma*, *Eucalyptus globulus*, *Vitis vinifera*, *Asparagus officinalis*, *Holcus lanatus*, *Mediola* sp. cultivé, *Eriobotryx japonica*, and *Nicotiana glauca*. To my own list, made in the winter, I subsequently added *Hyoseris radiata*, *Picridium vulgare* (also recorded by Raine), *Rubia peregrina* at San Salvadour, and *Galactites tomentosa* at Carqueiraune. Allowing for discrepancies and the fact that I could determine in winter the genus only of some plants, the combined lists give about eighty-five flowering plants found upon the Palms.—H. Stuart Thompson.

Alchemilla conjuncta Bab. (p. 306).—I was glad to see this note from Mr. Marshall, as I never understood why it was left out of the *London Catalogue*, ed. 10. There are (or were) specimens in the Chichester Museum gathered by Dr. Tyacke in Glen Sannox, but Watson always doubted its occurrence. It certainly is not a hybrid of *vulgaris* × *alpina*, of which I possess specimens from Switzerland, gathered by Dr. Christ, and given me by the late George Nicholson: see M. Buser's note in *Exchange Club Report for* 1891 (1892), p. 304. I possess a specimen from Glen Clova, gathered by Mr. A. O. Black, and given to me by Mr. F. J. Hanbury. I also possess a specimen from the Rev. Robert Wood, of Cumberland, who said it was gathered on the mountains in that county. This was not the record mentioned in "Notes from the Royal Bot. Garden, Edinburgh," 1904, p. 108, which was Mr. Bowman's; he always said that the plant brought by himself from Gatesgarth Dale was *A. alpina*, which remained unchanged in his garden. See also Prof. Trail's note (*op. cit.*). Now, after many years, Mr. Marshall gives us confirmation of the Glen Sannox station.—ARTHUR BENNETT.

ASPLENIUM LANCEOLATUM Huds. var. SINELII (p. 338).—Mr. Druce complains that we have misrepresented him by crediting him with this name. We have looked up J. F. Robinson's note on which Mr. Druce's remarks are based, and cannot find that he (Robinson) published the plant as a variety. In *Science Gossip* (1880, p. 148) the name appears as "*Asplenium lanceolatum* (Sinelii)" both in the text and in the index; Robinson indeed in the text speaks of it as a variety but also refers to it as a form, and the first combination of the names is that by Mr. Druce to which we referred. We note that Mr. Druce says that only a single plant was found; Robinson speaks of "several roots," but his notorious inaccuracy suggests doubt as to this in view of the definite information from the finder, quoted by Mr. Druce. We fail to see how the plant can be quoted otherwise than as *Asplenium lanceolatum* var. *Sinelii* Druce.—ED. JOURN. BOT.

REVIEWS.

Toadstools and Mushrooms of the Countryside; a Pocket Guide to the larger Fungi. By EDWARD STEP, F.L.S. With 8 coloured plates and 132 illustrations from photographs. Fcap 8vo, cl. gilt, pp. xvi. 143. Price 5*s.* net. Hutchinson & Co.

THERE was certainly room for a new popular book on Fungi, and the publishers of this volume have done well to obtain the services of Mr. Edward Step, whose works (uniform with the present) on wild flowers and trees have already obtained a large circulation. The volume before us is more needed than was either of these, for there is a plethora of books about wild flowers, whereas fungi have never received much attention, although the large sale of the handy *Guide to Sowerby's Models of Fungi* published by the British Museum has shown that there was a public for something more extensive in the same direction.

Mr. Step's descriptions are full and clear, but the attractiveness of his book is mainly due to its excellent illustrations from photographs—the result, he tells us, of many years' accumulation. We think, however, it would have been more useful both to the student and to the general reader had it been prefaced with an introduction dealing with the structure of fungi such as that which is prefixed to the Museum Guide already mentioned, with accompanying diagrams. "Matters of classification," Mr. Step says, are "of no interest to the majority of the readers for whom the book is projected"; this is no doubt true, but we think the interests of a somewhat more advanced class might profitably have been considered; the "classified index"—a mere list of names—in no way supplies what will be felt by many as a want. Other defects are the absence of a glossary or of anything in the way of a bibliography; the British Mycological Society and its annual forays should at least have been mentioned, for the benefit of those who may be stimulated by the book to proceed further in the study; we should have expected, too, to find a chapter on edible fungi, with a reference to the British Museum Guide to Mr. Worthington Smith's plates of true and false Mushrooms—the beautiful series of his drawings in the Natural History Museum is duly commended in the chapter on "toadstool-hunting."

The attempt to find English names for fungi was the subject of an amusing comment by Mr. Worthington Smith printed in this Journal many years ago. It may be conceded that folk in general are not likely to master without difficulty the Latin names; on the other hand, the botanist can hardly be expected to recognize what is intended by such titles as "the Blusher," "the Rooting Shank," "the Beautiful Horn," "the Wanton Toadstool," "the Pimply Cobweb-cap," "the Lawyer's Wig," "the Dryad's Saddle," and numbers of similar inventions; or of such names as the Magpie, the Brick, the Mallow, the Sweetbread, the Napkin, the Panther, when applied to objects so entirely different from those to which they are usually applied and to which—notwithstanding the Latin words of which they are in many cases a translation—they bear not the slightest resemblance.

All the same, the little volume is a useful addition to our popular scientific literature, and deserves (as it will doubtless obtain) a large circulation. It is, in fact, quite a good book; our only regret is that it is not better.

Die Süsswasser-flora Deutschlands, Österreichs und der Schweiz. Herausgegeben von Prof. Dr. A. Pascher (Prag.). Jena: Gustav Fischer. Heft 3, 2, 9, and 10. (1913.)

Heft 2. *Flagellatæ 2,* von A. Pascher und E. Lemmermann. This section of the work is exceedingly good and likely to prove of considerable value to the biologist who is interested in Flagellates. The classification is the best that has yet been put forward, and the descriptions of the groups and families are clear and precise. The figures are also good of their kind and are drawn with an accuracy which is rarely found in the cheap modern text-book. This little volume of 192 pages can be recommended to anyone who wishes to begin the study of the *Flagellata*.

Heft 3. *Dinoflagellatæ* (*Peridinieæ*), von A. J. Schilling. Concerning this section of the work one cannot be very enthusiastic. There is obviously an ignorance of the splendid American work on the Peridinieæ which has been done during the past twelve years, in consequence of which the nomenclature employed in describing the plates composing the cell-wall is out-of-date and unsatisfactory. The author accepts Klebs' proposals of 1912, although the reasons for the changes suggested by Klebs are by no means clear or sufficient. The Gymnodiniaceæ (including *Glenodinium*) is renamed the "Kyrtodiniaceæ" and the Peridiniaceæ (excluding *Glenodinium*) is renamed the "Krossodiniaceæ," but these new names are really unnecessary. The figures in some instances, especially of the species of *Cerastium*, are rather poor.

Heft 9. *Zygnemales*, von O. Borge und A. Pascher. The special systematic section by Dr. Borge is a good summary of the Zygnemaceæ of the three countries under consideration, but the descriptions are sometimes too brief, and the entire absence of critical remarks detracts considerably from the value of what otherwise might have been a most useful work. The figures in many cases are not very good, and they are mostly too scrappy to be really of value in identifying species. Debary's genus *Zygogonium* (not the *Zygogonium* of Kützing), recently upheld by Wille (1909), is here accepted by both authors, although it appears to be founded upon two examples of monstrous conjugation of *Zygnema ericetorum*. The description of this alga as having "1 axiles Chromatophor mit 1 Pyrenoid" is also wrong.

Heft 10. *Bacillariales* (*Diatomeæ*), von H. v. Schönfeldt. This little volume of 187 pages is an attempt to condense the diatom-flora of three countries into a very small space. It may enable the student to identify the larger and commoner types of diatoms, but he would find himself in great difficulties with many of the smaller and more critical species. The figures cannot be described as very good, and they are rather too small. Moreover, few, if any, appear to be original. Good figures of the common forms of fresh-water diatoms yet remain to be published.

G. S. WEST.

BOOK-NOTES, NEWS, &c.

AT the meeting of the Linnean Society on 6th November, Mr. H. Hamshaw Thomas, on behalf of himself and Miss Nellie Bancroft, explained the main points of a joint paper as follows:—An investigation of the cuticles of some recent and fossil Cycadean fronds was undertaken with a view to determining the probable relationships of the modern group to the Mesozoic Cycadophyta. The value of the epidermal and stomatal characters in classification and comparison is indicated by the fact that each living genus possesses a characteristic cuticular structure; the guard-cells of the stomata, however, conform to a constant ground-plan. In the case of the fossil fronds, the stomata are constructed on very similar lines to those in the recent forms, though they differ in one or two directions. These fronds fall into two groups—(1) Bennettitales, containing the majority of the Mesozoic fronds previously considered as Cycadean; (2) Nilssoniales, including such fronds as *Nilssonia*, *Ctenis*, and *Ptilozamites*. The first group is characterized by the possession of epidermal cells with sinuous walls, while the stomata, which have characteristically thickened guard-cells, are always subtended by a pair of subsidiary cells. In these points the group is distinguished from the recent forms and from the Nilssoniales, while showing some similarity with the Gnetales. The second group agrees with the modern forms rather than with the Bennettitales, having straight epidermal cell-walls and stomata with four or more subsidiary cells. If the ancestors of modern Cycads are to be found in the Mesozoic rocks, cuticular structure indicates that they are to be sought among forms possessing fronds of the *Nilssonia* type.

The Cambridge University Press publishes in its "Nature Study Series" an excellent and cheap little book on *Weeds*, by Mr. R. Lloyd Praeger (1*s.* 6*d.* net), to which Miss Rosamond Praeger and Mr. R. J. Welch contribute illustrations. It is just the book for intelligent children who, by means of the school-gardens which are making way among us, are familiar with the practical developments of plant-life. The "particular illustrations," the author tells us, are drawn from Ireland, although the lessons will be found applicable to any portion of the British Isles; it would however perhaps have been better if the sketch of the vegetation (pp. 8–12) had been more general. The chapter describing "some common weeds" (of which the Irish as well as the English names are given) is admirably done, but indeed the whole book is in every way satisfactory—there is a capital index, and the typography and binding are excellent.

As might be expected, the recent war in Tripoli has led to the publication of papers on the natural history of the district. Among them is a "Contribution à la flore algologique de la Tripolitaine et de la Cyrénaïque," by Prof. G. B. De Toni & A. Forti (*Annales de l'Institut Oceanographique*, v. fasc. 7, 1913, 56 pp.), founded on collections made at Tobrouk and Benghazi by Dr. Vaccari of the Italian navy, and in Tripoli by Prof. A. Trotter. The main interest of the paper is its list of diatoms, no species having ever before been recorded for the Tripoli coast; 156 species are here enumerated. *Amphora inæquistriata*, a freshwater species, is new to science: and some of the larger algæ are also new records for the region.

The botanical contents of the September number (vol. iii. n. 2; issued Oct. 28) of the *Journal of Genetics* are a long paper on "Reduplication Series in Sweet Peas," by Mr. R. C. Punnett, one of the editors, and a short "Note on Gametic Reduplication in *Pisum*" by Miss Caroline Pellew. The other papers in the number treat of genetics in its relation to zoology.

NEWSPAPER BOTANY.—THE *Westminster Gazette* of October 23 had a poem on "the Flowering Aloe," based on the venerable fiction "that the Aloe flowers once only in a hundred years, and then dies." It begins:—

> "A hundred years to hoard thy sweetness up.
> A hundred years to hold this golden bloom."

and ends:

> "Squandering in one brief month the patient years,
> The Aloe Flower her royal bloom uprears,
> Then, shrivelled, withered, brown, sinks dead to earth."

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A
MONOGRAPH
OF THE
BRITISH WILLOWS.

BY

REV. E. F. LINTON, M.A.

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Instructions to Binder.—The first 8 pp. of the *Salix* Monograph in the April number is withdrawn, and the corrected copy in the July number is to be substituted.

ADDENDA ET CORRIGENDA, &c.

(*Continued from p.* 88.)

Page 26, line 2, for Œsterr. read Oesterr.
,, 38, ,, 10 from bottom, after Faldonside add (see Note, p. 88).
,, 88, ,, 8 from bottom, for 5 read 28.

THE BRITISH WILLOWS.

By the Rev. E. F. LINTON, M.A.

Introductory.

The serious study of Willows in this country began with Sir J. E. Smith, who had laboured at working out the species for "full thirty years" before the date of his *English Flora* (1828), observing their growth in the garden of James Crowe at Norwich, who grew them in large numbers. Smith, however, overshot the mark in the multiplication of species through disbelieving in the existence of hybrids, and making species of many forms that were of hybrid origin, and many more that have proved to be but slight varieties, thus expanding our list to the number of sixty-four British species. This list was much condensed by Lindley, Babington, and Boswell Syme, but no thorough revision was made affecting our list till N. J. Andersson had published his *Monographia Salicum* (1867), of which only part i. was issued, and his complete account of the genus *Salix* in De Candolle's *Prodromus* (1868). His views were adopted and closely followed by Sir J. D. Hooker in the third edition of the *Student's Flora of the British Isles* (1884), with a reduction of the number of species to eighteen, and were reproduced more fully by F. B. White in his "Revision of the British Willows" (Journ. Linn. Soc. xxvii. 1890), who added some new hybrids to those already known, and further reduced the number of British species to seventeen by combining, as Linnæus had originally done, *S. phylicifolia* and *S. nigricans*.

For a detailed account of the various parts of the Willow and their development, Wimmer's *Salices Europææ*, pp. xxiv.–xliv., should be consulted; also the *Classification des Saules d'Europe*, by A. & E.-G. Camus, pp. 11–14, and for the internal morphology, pp. 14–40.

Salix is a difficult genus to study; partly because the floral organs and foliage have to be collected at different seasons, and partly because there is development and change of character in both flowers and leaves during the season of growth. The twigs, buds, and leaves of most of the species are more or less clothed with pubescence at first, and, while this pubescence is persistent in a few species, it is evanescent in more, disappearing very rapidly in some, and more gradually in others. The female catkins, often oval or even subglobose at first, elongate by degrees, and are usually at length cylindric. The bracts of many species, almost concolorous in the earliest stage, are tipped or rimmed with blackish-brown at maturity. The relative length of the pedicel and nectary is an important character, but very liable to be misjudged and consequently undervalued; it should be observed that, while the nectary is full-grown from the first, the pedicel of species with pedicelled ovaries goes on lengthening till maturity, and the two organs may be, to begin with, of equal length, and eventually in the proportion of 3–5 to 1; the description is, of course, taken from the later stage. Of late some doubt has been thrown on the value of this character in the determination of hybrids. I can only say that I have found the proportion of pedicel and nectary very fairly constant in the same species, and in the case of hybrids always (with one or two exceptions) between the limits of their range in the two parent species, and a very useful corroborative character in the determination of plants whose hybrid origin was suspected on other grounds.

The following is a list of the works, books and exsiccata, most frequently quoted, with the abbreviations by which they are referred to:—

Books.

Anderss. Sal. Lapp. = N. J. Andersson, Salices Lapponicæ (1845).
Anderss. Monogr. = N. J. Andersson, Monographia Salicum (1867).
Anderss. DC. Prodr. xvi. (2) = in De Candolle's Prodromus, vol. xvi. part 2 (1868).
Camus Monogr. = Classification des Saules d'Europe et Monographie des Saules de France (1904), by A. & E.-G. Camus.
Camus Atlas = Atlas to the same work.
Doell = Doell, Flora von Baden (1859).
E. Bot. = J. E. Smith, English Botany (1790–1814).
E. B. S. = Supplement to English Botany (1831, &c.).
Fl. Dan. = Flora Danica (1761, &c.).
Forbes = Salictum Woburnense, by James Forbes (1829).
Gren. & Godr. = Grenier & Godron, Flore de France (1846–56).
Hartman = Hartman, C. J., Handbok i Skandinaviens Flora (ed. 3, Stockholm), ed. 11 (1879).
Hoffmann = Hoffmann, Historia Salicum (1785–91).
Koch Syn. = Koch, Synopsis Floræ Germ. et Helv. (ed. 2, 1843).
L. Sp. Pl. = Linnæi Species Plantarum, ed. 1 (1753).
Ray Syn. = Raii Synopsis Stirpium Brit. (ed. 2, 1696, the most accurate), ed. 3, 1724.
Seemen = O. v. Seemen in Ascherson und Graebner, Synopsis Mitteleurop. Flor. vol. iv. (1908–09).
Séringe = N. C. Séringe, Essai d'une Monographie des Saules de la Suisse (Berne, 1815).

Sm. Engl. Fl. = J. E. Smith, English Flora, vol. iv. (1828).
Sm. Fl. Brit. = J. E. Smith, Flora Britannica (1800–04).
Sm. in Rees Cycl. = Cyclopædia, by Abraham Rees, vol. xxxi. (1819); *Salix*, by Sir J. E. Smith.
Syme, E. B. = J. Syme (Boswell-Syme), English Botany, 3rd ed. vol. viii. (1868).
Wade = Walter Wade, Essay towards a General History of Sallows, Willows, and Osiers (Dublin, 1811).
B. White Revision = F. Buchanan White, A Revision of the British Willows, in Journ. Linn. Soc. xxvii. pp. 333–457 (1890).
Wimmer Sal. Eur. = F. Wimmer, Salices Europææ (1866).

Exsiccata.

Baenitz, Hb. Europ. = Baenitz, Herbarium Europæum.
Billot = Billot, Flora Gallica et Germanica exs.
Enander = S. J. Enander, Salices Scandinaviæ (1905–10).
Fries = E. Fries, Herbarium normale.
Hb. Borrer = Herbarium of W. Borrer (at Kew).
Hb. Boswell = Herbarium of Boswell-Syme, curâ F. J. Hanbury.
Hb. Edinb. = Herbarium at Royal Botanic Garden, Edinburgh.
Herb. Kew = Herbarium (General), Kew.
Hb. Linn. = Herbarium of Linnæus, Linnean Society.
Hb. Smith = Herbarium of Smith, Linnean Society.
Hb. B. White = Herbarium of F. B. White in Perth Museum (Cat. in Trans. Perthshire Soc. Nat. Sci. vol. i. part iv. (1889–90)).
Kerner Hb. Oesterr. Weiden = A. & F. Kerner, Herb. Oesterreichische Weiden (1859).
Leefe, Sal. Brit. = J. E. Leefe, Salices Brit. exs. (1842, 1844).
Leefe, Sal. exs. = J. E. Leefe, Salices exs. (1870–76).
Linton, E. F. & W. R. = E. F. & W. R. Linton, British Willows (1894–98).
Magnier = Ch. Magnier, Flora Selecta exs.
Toepffer = Ad. Toepffer, Salicetum exs. (1906–11).
Wimmer, Sal. Relictæ = Salices Wimmeri Relictæ.

The specimens in the Linnean Herbarium and in Smith's have no numbers for reference; but in 1907 S. J. Enander examined that of Linnæus and published a detailed account of the willows it contained (*Studier öfver Salices i Linnés Herbarium*, Upsala, 1907), in which he applied the numbers previously employed by C. J. Hartman to his description of every sheet, adding figures or letters to distinguish different specimens on one sheet, and these reference numbers are now quoted. Some of Smith's specimens are also referred to, but there are no numbers for identification.

The Herb. Sal. and Coll. Sal. of Wimmer & Krause have not been examined, but many of the willows in them are represented in Wimmer's Sal. Relictæ, copies of which are in my possession and in the British Museum, wherein those have been examined which are quoted below.

Many sheets of the Exs. of Billot and C. Magnier have been seen in the herbarium of Charles Bailey, F.L.S.; J. E. Leefe's second set (Sal. Exs.) has been seen in that and other collections, and I possess his earlier set (Sal. Brit. Exs.).

Few references are possible to the General Herbaria of the British Museum or Kew, or to those of Borrer (at Kew), of the Royal Botanic Garden, Edinburgh, or of Boswell-Syme, for want of numbers. The numbered sheets of S. J. Enander's Sal. Scand. and of the Sal. Exs. of Ad. Toepffer, both of whom have supplied me generously with letterpress and specimens, and of the herbaria of the late Rev. W. R. Linton (now in the possession of the Liverpool University) and of the Rev. E. S. Marshall, to whom I am greatly indebted for very numerous specimens of his collecting with notes, are frequently quoted.

SYNOPTICAL TABLE OF SPECIES AND HYBRIDS.

The following arrangement is based largely on the order adopted by N. J. Andersson in De Candolle's *Prodromus*, the main divisions of which depend on the number of stamens, *viz.* *Pleiandræ*, *Synandræ*, and *Diandræ*. He placed *Fragiles* and *Albæ* among the *Pleiandræ* because their other floral characters connect them with that group; and this is their right position, though the stamens are only two, for three are very exceptional. *Synandræ* are removed from the end of the list, where they were placed by Andersson, next to alpine species (to which they have no relation), to a position preceding the *Diandræ*, next to the *Viminales* and *Capreæ*, lowland plants for the most part which are their nearest allies. *S. lapponum* is taken out of the *Niveæ*, having no great affinity with *S. lanata*, and placed in the *Viminales*, in accordance with the views of Wimmer, who pointed out the many features which this species and *S. viminalis* have in common.

A. PLEIANDRÆ.

Stamens 2, 3 or more; bracts concolorous.

i. Pentandræ.

1. S. PENTANDRA L.

ii. Amygdalinæ.

2. S. TRIANDRA L.

subsp. *Hoffmanniana* Sm. × *viminalis*.

iii. Fragiles.

3. S. FRAGILIS L.

b. *britannica* B. White. × *pentandra*.
subsp. *decipiens* Hoffm.

iv. Albæ.

4. S. ALBA L.

b. *cærulea* Sm.
c. *vitellina* (L.).
× *fragilis.*
× *pentandra.*
× *triandra.*

B. SYNANDRÆ.

v. Purpureæ.

Stamens 2, adnate or connate; bracts brown or blackish-brown at the top.

5. S. PURPUREA L.

× *aurita.*
× *aurita* × *phylicifolia.*
× *cinerea.*
× *phylicifolia.*
× *repens.*
× *viminalis.*

C. DIANDRÆ.

Stamens 2, free; bracts brown, blackish or red at the tip.

vi. Viminales.

6. S. VIMINALIS L.

× *aurita.*
× *caprea.*
× *cinerea.*
× — (*S. stipularis* Sm.)
× — (*S. acuminata* Sm.).

7. S. LAPPONUM L.

× *myrsinites.*
× *phylicifolia.*
× *repens.*
× *reticulata.*

8. S. AURITA L.

× *caprea.*
× *cinerea.*
× *cinerea* × *nigricans.*
× *herbacea.*
× *lapponum.*
× *myrsinites.*
× *myrsinites* × *nigricans.*
× *nigricans.*
× *phylicifolia.*
× *repens.*

9. S. CAPREA L.

× *cinerea.*
× *lanata.*
× *lapponum.*
× *myrsinites.*
× *nigricans.*
× *phylicifolia.*
× *repens.*

10. S. CINEREA L.

× *nigricans.*
× *phylicifolia.*
× *repens.*

vii. Argenteæ.

11. S. REPENS L.

× *viminalis.*

viii. Phylicifoliæ.

12. S. NIGRICANS Sm.

× *phylicifolia.*

13. S. PHYLICIFOLIA (L.) Sm.

× *repens.*

ix. Arbusculæ.

14. S. ARBUSCULA L.

× *herbacea.*
× *lapponum.*
× *myrsinites ?*
× *nigricans.*
× *phylicifolia.*

x. Niveæ.

15. S. LANATA L.

× *lapponum.*

xi. Myrtosalix.

16. S. MYRSINITES L.

× *nigricans.*
× *nigricans* × *phylicifolia.*
× *phylicifolia.*

xii. Herbaceæ.

17. S. HERBACEA L.

× *lanata.*
× *lapponum.*
× *lapponum* × *myrsinites ?*
× *myrsinites.*
× *nigricans.*
× *phylicifolia.*
× *repens.*
× *reticulata.*

18. S. RETICULATA.

SALIX.

GENERIC DESCRIPTION.

Trees or shrubs differing from *Populus* in making no suckers, in the absence of stone cells from the bast, and in the presence in the periderm of cells whose walls are thickened on the outer side only, the thickenings suberised not lignified (E. F. Perrédès).

Stipules persistent, deciduous or absent. Leaves petioled, usually alternate, simple, deciduous, entire or serrate.

Flowers diœcious, arranged in catkins; catkins erect at least at first, ± leafy, usually preceding the leaves or coeval with their early stages; ♂ soon deciduous, ♀ persistent till the fruit matures; rachis usually pubescent. Perianth 0; bracts entire, pubescent, rarely glabrous, concolorous or discoloured at the tip; nectary of 1–2 glands; stamens 2, 3, or more, filaments free or connate, anthers basifixed; ovaries superior, sessile or pedicelled, 1-celled with 2–4 parietal placentas; styles long, short or 0; stigmas 2, entire or 2-fid; ovules many inserted on the placentas in the lower half of the ovaries, ascending anatropous. Capsules 1-celled, few-seeded, dehiscing from the top; valves 2, recurving when mature; seeds small, wrapped in silky hairs attached to the short funicle; albumen 0; embryo straight, cotyledons oblong plano-convex, radicle short inferior.

The seeds germinate with great rapidity under favourable conditions, soon losing their vitality otherwise.

CONSPECTUS OF GROUPS.

I. Bracts of the catkins not blackened at the tip. Stamens 2 or more, free.
  i. Catkins terminal; bracts concolorous or reddish, and not blackened at the tip; stamens 2. Very dwarf alpine shrubs.
    1. Herbaceæ. Leaves glabrous, green on both sides. Catkins on short leafy peduncles; ovaries glabrous.
    2. Reticulatæ. Leaves silky at first, glaucous beneath. Catkins on long leafless peduncles; ovaries tomentose.
  ii. Catkins lateral, bracts concolorous; ovaries glabrous. Trees or tree-like shrubs, mainly lowland.
    3. Pentandræ. Leaves glabrous, glutinous. Flowers with 2 nectaries; bracts deciduous; stamens 5 (4–8); ovaries subsessile.
    4. Amygdalinæ. Leaves glabrous almost from the first. ♂ flowers with 2 nectaries; bracts persistent; stamens 3; ovaries long-pedicelled; stigmas subsessile.
    5. Fragiles. Leaves soon glabrescent. Nectaries single; bracts deciduous; ovaries rather short-pedicelled, attenuate into a long style; stamens 2.
    6. Albæ. Leaves silvery at first, with subpersistent pubescence. Nectaries single; bracts soon deciduous; ovaries and stigmas subsessile; stamens 2.

II. Catkins with their bracts blackened or darkened at the tip, ± pubescent. Stamens 2.

- A. Stamens adnate so as to appear single, each with a 4-celled anther (or partially united in the hybrids).
  - 7. PURPUREÆ. Branches and leaves glabrous (or almost so) from the first (hybrids if pubescent soon glabrescent).
- B. Stamens 2, free (or joined only at the very base).
- i. Pedicels of ovaries elongating, towards maturity 3–4 times as long as the nectaries; nectaries quadrate or shortly oblong.
  - 8. CAPREÆ. Leaves not blackening when dried, stipules foliaceous broad; ovaries pubescent, styles usually short or 0.
  - 9. PHYLICIFOLIÆ. Styles long.
    - α. *S. phylicifolia.* Leaves glabrous (theoretically), subcoriaceous, not blackening, entire at the tip; stipules not prominent. Ovaries usually pubescent; 1-year wood polished dark brown.
    - β. *S. nigricans* Smith. Leaves very pubescent at first, ± glabrescent, blackening when dried; stipules prominent foliaceous. Ovaries usually glabrous; 1-year wood dull grey brown.
  - 10. ARGENTEÆ. Dwarf shrubs, much branched from the base; leaves finely reticulate above with raised veins, commonly blackening when dried; stipules 0 or inconspicuous, narrow ovate. Ovaries commonly pubescent; styles usually rather short.
- ii. Pedicels of ovaries 0 or very short; shorter than the nectaries (lowest sometimes longer). Styles long.
- A. Nectaries quadrate, about as long as the pedicels of the ovaries, or only shorter than the lowest.
  - 11. MYRTOSALIX. Leaves green and glossy on both sides, serrate.
- B. Nectaries linear, reaching to the broadest part of the ovaries.
  - 12. NIVEÆ. Leaves pubescent, with long silky hairs in early growth, blades entire. Catkins densely silky; ovaries glabrous.
  - 13. ARBUSCULÆ. Leaves commonly pubescent at first, soon glabrous, rather coriaceous, serrate. Ovaries pubescent; anthers purplish-red.
  - 14. VIMINALES. Leaves silkily pubescent, blades entire or subentire. Ovaries pubescent sessile; anthers yellow or slightly tipped with red.
    - α. *S. viminalis* L. Leaf-blades lanceolate, long, entire or obscurely crenate; pubescence beneath appressed; stipules lanceolate.
    - β. *S. lapponum* L. Leaf-blades short, entire, with lax pubescence; stipules 0.

Analytical Table.

1	Catkins terminal, stamens 2	2
	Catkins lateral on the last year's branches	3
2	Leaves glabrous green on both sides; catkins on short leafy peduncles, ovaries glabrous	Herbaceæ.
	Leaves ± silky at first, glaucous beneath; catkins on long leafless peduncles, ovaries tomentose	Reticulatæ.
3	Stamens 2 or more, free; bracts concolorous, glabrous, or thinly hairy towards the extremities; ovaries glabrous	4
	Stamens 2, free (or united only at the base); bracts persistent, tips discoloured, silkily hairy	6
	Stamens 2, adnate or ± connate; anthers purple (unless in some hybrids), bracts discoloured at the tip	Purpureæ.
4	Stamens 5 (4–8); bracts fugitive; catkins later than the leaves; male and female flowers with two nectaries	Pentandræ.
	Stamens 3; catkins coeval with the leaves; bracts persistent; male flowers with two nectaries	Amygdalinæ.
	Stamens 2; catkins coeval with the leaves; bracts deciduous	5
5	Ovaries gradually acuminate into a style longer than the stigmas; their pedicels twice as long as the nectaries; stipules large, broad below	Fragiles.
	Ovaries suddenly contracted into a very short style; pedicels shorter than the nectaries; stipules 0 or narrow lanceolate	Albæ.
6	Ovaries subsessile or lowest shortly stalked, nectaries quadrate	Myrtosalix.
	Pedicels of ovaries 3–4 times as long as the quadrate or shortly oblong nectaries	7
	Ovaries sessile or subsessile, the lowest sometimes shortly stalked; nectaries linear, exceeding the base of the ovaries	9
7	Styles long	Phylicifoliæ.
	Styles short, as a rule	8
8	Large shrubs or small trees, usually erect growing, stipules foliaceous broad, leaves not blackening	Capreæ.
	Dwarf shrubs, much branched from the base, usually prostrate or ascending, stipules inconspicuous narrow, leaves finely reticulate, ± blackened when dry	Argenteæ.
9	Ovaries glabrous; male catkins densely silky with the long yellowish silky hairs of the bracts	Niveæ.
	Ovaries tomentose; male catkins ± silky, variable	10
10	Leaves glabrous or nearly so, serrate; ovaries small, style not long	Arbusculæ.
	Leaves silkily pubescent on one or both sides, entire (*S. lapponum*), or obscurely crenate (*S. viminalis*); ovaries rather large, with long style and stigmas	Viminales.

i. PENTANDRÆ.

1. SALIX PENTANDRA L. Sp. Pl. 1016 (1753). Sm. in Rees Cycl. No. 12. Anderss. Monogr. i. 35. Wimmer, Sal. Eur. p. 22. Anderss. in DC. Prodr. xvi. (2), 206. Syme, E. B. viii. 202. B. White, Revision, 359. Camus, Monogr. 84. Seemen, p. 61.

Icon. E. Bot. t. 1805. Fl. Dan. t. 943. Anderss. Monogr. t. ii. f. 24. Camus, Atlas, t. 4, A–I. Forbes, t. 34.

Exs. Hb. Linn. Nos. 1–3. Billot, 1065. Wimmer, Sal. Relict. (Herb. Sal. 49; Coll. Sal. 7, 8). Leefe, Sal. Brit. Nos. 1, 2. E. F. & W. R. Linton, British Willows, No. 1. Toepffer, Nos. 33–35, 75.

A bush or small tree, rising to 20 ft. Branches glabrous, grooved while young, at length polished brown or reddish-brown, fragile at the base. Stipules oval or ½-cordate gland-ciliate, caducous. Petioles with 1–3 pairs of glands (sometimes subfoliaceous) near the top. Leaves glabrous; blades 2–4 in. long by ¾–1 in. broad, oval or obovate-oblong to obovate- or oblong-lanceolate, acute, rounded at the base, finely gland-serrate, ciliate with glutinous glands, glossy or deep green above, pale green and reticulate with deep green veins beneath, fragrant (like bay).

Catkins opening rather later than the leaves in May or June, broad, dense-flowered; peduncles elongate leafy, erect to curved; rachis woolly-pubescent; staminate catkins 1–1½ in. long, rounded at the top, bracts oblong or lingulate obtuse pubescent near the base, glabrous above; stamens usually 5 (4–8); filaments long, crowded, pilose in the lower half; anthers golden yellow. Pistillate catkins 1–2 in. long, ovaries at length ¼ in. long, subulate to ovoid-subulate, glabrous, shortly pedicelled, lower pedicels at length twice as long as the short bipartite nectaries; style short or 0, stigmas large 2-lobed, spreading.

This species varies much in the breadth of the leaves. Andersson (*l. c.*) makes three leaf varieties, *latifolia*, *angustifolia*, and *microphylla*, which are, however, not more distinct than others based on the size of the catkins. A good-sized tree growing in deep peat or in rich soil produces large broad leaves; a drier climate or a poorer soil may contribute to the occurrence of narrower-leaved forms, such as are commoner on the Continent than with us.

S. pentandra is a lowland species, which is said to be native as far south as Carnarvonshire, Salop, Notts, and Lincolnshire (naturalized or planted southwards), and is generally distributed, though local, over the North of England and the Lowlands of Scotland. It is plentiful and native in the Northern Counties of Ireland, and becomes scarcer southward, where it is more commonly than not planted. On the Continent it is distributed through North Europe at low levels, in Central Europe in mountainous regions, extending as far south as the Pyrenees, Piedmont, the Balkans; Caucasus, Siberia; North America.

S. alba × *pentandra* (p. 19).
S. fragilis × *pentandra* (p. 15).

ii. AMYGDALINÆ.

2. SALIX TRIANDRA L. Sp. Pl. 1016. Wade, Essay, p. 6. Séringe, Essai, p. 75. Sm. in Rees Cycl. 3; Engl. Fl. iv. 166. Leefe in Trans. Bot. Soc. Edinb. i. 158, 159 (1844). Anderss. Monogr. i. 23; DC. Prodr. xvi. (2), 202. Wimmer, Sal. Eur. 12. Syme, E. B. viii. 215. B. White, Revision, 347. Hartman, p. 361. Seemen, iv. p. 74.—*S. amygdalina* L. Sp. Pl. 1016. Sm. in Rees Cycl. 7; Engl. Fl. iv. 169. Anderss. Sal. Lapp. 17. Doell, p. 489.

Icon. Hoffm. Hist. Sal. t. 23. E. B. 1435, and as *S. amygdalina*, 1936. Forbes, Sal. Wob. tt. 15, 18 (*S. amygdalina*). Camus, Atlas, pl. 5, 6.

Exs. Hb. Linn. Nos. 15, 22. Hb. Smith (*S. amygdalina*). Wimmer, Sal. Relict. (Herb. Sal. 38, 51, 122; Coll. Sal. 13, 14). Leefe, Sal. Brit. exs. Nos. 4, 7, 8; Sal. exs. Nos. 49, 105. Hb. B. White, Nos. 238, 239, 277, 395, 396. E. F. & W. R. Linton, No. 26. Toepffer, Nos. 42, 43, 50, 244.

A large shrub or small tree, 15–30 ft. high, lax in habit, bark loose and flaking off old stems, twigs rather fragile at the base, ± furrowed when young, glabrous almost from the first; buds ovoid, soon glabrous. Stipules common, broad roundish or bluntly pointed, rather persistent; petioles with 2 or 3 glands near the top. Leaf-blades very variable, 1–4 in. long by $\frac{1}{2}$–$1\frac{1}{2}$ in. broad, oblong-lanceolate or ovate-oblong acuminate, evenly serrate, glabrous (or slightly pubescent on opening), dark green and somewhat shining above, paler green (f. *concolor*) or more commonly glaucous (f. *discolor*) beneath.

Catkins coeval with (or ♂ even before) the leaves, in late April or May, on short leafy peduncles, slender erect or spreading, basal leaves usually serrate; staminate catkins $1\frac{1}{4}$–2 in. long, bracts obovate hairy only below or ciliate, stamens 3, filaments pilose at the base; nectaries double; pistillate catkins $1\frac{1}{4}$–2 in. long, bracts glabrous or ciliate and glabrescent above, pilose near the base, narrow oblong or rarely linear-lanceolate, yellowish. Ovaries $\frac{1}{8}$–$\frac{1}{6}$ in. long, conical then ovoid, glabrous, often reddened in exposure, long-pedicelled; pedicels elongating, at length 3–4 times as long as the short broad single nectaries; stigmas sessile, short, thick.

The leaves of this species vary so much that many varieties have been based on the leaf-blades only. Wimmer arranges these under chief forms:—(α) *vulgaris*, with leaf-blades narrowly oblong, equally narrowed at both ends, acute rather than acuminate; (β) *angustifolia*, leaf-blades elongate linear-oblong or oblong-lanceolate acuminate; (γ) *Villarsiana*, branches short, leaves small short oval or narrow-oval. Each of these forms is sub-divided into those with glaucous and those with green under side of leaf-blade.

Andersson remarks that there are so many forms of leaf and catkin which have sported freely, that it is hard to define the leading varieties; and then gives four; the first pair (α and β) are distinguished by the glaucous or green colouring of the under side of the leaf-blade, each of which has a f. *latifolia*, f. *angusti-*

folia, and f. *microphylla* under it; the second pair by the breadth of the catkins and density of the flowers.

S. amygdalina L., hazy in its origin, was regarded by Smith as a distinct species (E. B. t. 1936; Engl. Fl. iv. 169); but his description and plate show only a form of *S. triandra* with a more rounded leaf-base than usual, not worth distinguishing as a variety. *S. contorta* Crowe (see Engl. Fl. iv. 167) was a ♂ plant cultivated in Sussex, a small-leaved *S. triandra* form, said to be introduced and of French origin.

Subsp. HOFFMANNIANA (Sm.).

Syn. S. *Hoffmanniana* Sm. Engl. Fl. iv. 168. E. B. S. No. 2620. Leefe in Trans. Bot. Soc. Edinburgh, i. 159 (1844).

Icon. Hoffm. Hist. Sal. tt. ix. x. Forbes, Sal. Wob. 16.

Exs. Hb. Smith, "*S. triandra ?* a shrub of more humble growth, &c. Mr. Borrer, 1825." E. F. & W. R. Linton, No. 27.

A small bush or dwarf tree, 5–13 ft. high, with bark flaking off, as in *S. triandra* L., with dense interlacing branches in trees of some age, forming a compact rounded head; twigs slender, terete or subterete, somewhat fragile at the base. Stipules foliaceous, prominent, rounded. Leaf-blades 1½–2½ in. long, ovate-oblong acuminate, of a light or yellowish green, green not glaucous beneath, ± rounded at the base, rather crowded, nowhere parallel-sided.

Catkins ¾–1½ in. long, fl. May; ♂ frequent in Britain, smaller and more slender, and a week or two later in flowering than *S. triandra*; bracts usually more pubescent within and without, as Hoffmann represents them (*l. c.* t. ix.).* In E. B. tab. the bracts are drawn with this character reversed, and the bracts of *S. triandra* the more hairy of the two, which does not agree with Smith's views, who found "no remarkable difference in the catkins of either sort" (Engl. Fl. iv. 168).

This form is placed as a subspecies, being much more distinct from *S. triandra* than most so-called varieties of willows, which differ from their species in the shape of the leaf or the size of the catkin. The ♂ plant is frequent in the South and S.E. England; the ♀ is known to me only from the neighbourhood of Walmer, Kent, and by specimens in Kew Herbarium (Hb. Bromfield) from a brookside not far from Shanklin Church, Isle of Wight, 1840.

S. triandra is found by streams and in wet ground as a lowland willow in nearly every English county, and in the most northern and most southern Welsh counties. It is recorded from half a dozen Scotch counties; usually planted in all its localities in the British Isles, owing to its utility as an osier. It is, however, undoubtedly self-sown at times, and probably native in S.E. and Central England. In Ireland it may be native in four S.E. counties; elsewhere it is scarce and introduced. It is in great request as an osier for basketwork, &c., and growers distinguish many varieties. In the Elmore osier plantation at Thurmaston,

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* Female catkins, very rare, scarcely differ from those of *S. triandra*, unless in the pubescence of the bracts.

Leicester, a few years ago, there were twenty-two named sorts in cultivation, of which "Pomeranians," "Councillor," and "Black Maul" were commended as the best. Subsp. *Hoffmanniana* was not noticed among these, being probably too "spriggy," a bad defect in an osier. Europe generally; Asia in the Caucasus, Armenia, Persia, Turkestan, China, and Siberia.

S. triandra × *alba* (p. 20).
× *fragilis* (p. 15).
× *viminalis* (p. 13).

SALIX TRIANDRA × VIMINALIS.

Syn. *S. hippophaefolia* Thuill. Fl. Par. 2 éd. 514 (1799). Doell, 506. Gren. & Godr. iii. 127.—*S. triandra-viminalis* Wimmer in Flora, xxxii. (1849), 39. Sal. Eur. 140. B. White, Revision, 357.—*S. amygdalina* × *viminalis* Doell, 506. Seemen, iv. 332.—*S. multiformis* Doell, Anderss. DC. Prodr. xvi. (2), 271.

Exs. Leefe, Sal. exs. ii. 45; iv. 94. E. F. & W. R. Linton, No. 28.

Var. *a*, *hippophaefolia* (Thuill.).

A large riverside shrub with glabrescent twigs and buds. Stipules ovate- to cordate-lanceolate. Leaf-blades 3–5 in. long, linear-lanceolate but with some variation in length and breadth, obscurely serrulate or crenate-serrate, dark green somewhat shining above, paler green beneath, pubescent at first but soon glabrous, margin reflexed, vernation revolute. Catkins 1 in. long; stamens 2, sometimes 3; ♀ elongating to 1½ in.; bracts ovate-oblong obtuse villous, nearly as long as the finely pubescent ovate-conic (at length broadly ovate) ovaries; pedicels about as long as the narrow oblong nectaries; styles and stigmas about equal.

A curious monœcious form, distributed by the Rev. A. Ley, from near Ross-on-Wye, has stamens and ovaries mingled together on each catkin.

S. hippophaefolia is grown in the Thurmaston holts, under the name of "Black Tops," and considered a very good osier.

Var. *β*, *Trevirani* (Sprengel).

Syn. *S. Trevirani* Sprengel, Pug. i. 61 (1813). Wimmer, Sal. Eur. 114.—*S. triandra* × *viminalis* B. White, Revision, 357.

Icon. Forbes, Sal. Wob. t. 14 (as *S. undulata* Forbes, non Ehrh.).

Exs. Wimmer, Sal. Relict. (Herb. Sal. 113, 115; Coll. Sal. 249–251).

S. Trevirani differs from *S. hippophaefolia* Thuill. chiefly in being on a larger scale with broader and more attenuate leaf-blades more glabrous from the first, larger catkins and glabrous ovaries. It is nearer *S. triandra*, as *γ* *S. mollissima* Ehrh., which Andersson makes a third variety of this hybrid, is nearer *S. viminalis*. Dr. B. White thought that the Herefordshire and Staffordshire ♂ specimens (*l. c.* p. 357) belonged to × *S. Trevirani*.

S. hippophaefolia, to which all our ♀ plants undoubtedly belong, occurs in seven counties, from Gloucester and Glamorgan to Derbyshire and Leicester. Central Europe, from France to Russia, and Sweden.

iii. Fragiles.

3. Salix fragilis L. Sp. Pl. 1017. Anderss. Monogr. 41, n. 28; DC. Prodr. xvi (2), 209. Wimmer, Sal. Eur. 19. Syme, E. B. viii. 205. B. White, Revision, 368. Camus, Monogr. 76. Seemen, iv. 70.—*S. Russelliana* Sm. Fl. Brit. 1045; Engl. Fl. iv. 186; in Rees Cycl. 39.—*S. fragilis* var. *Russelliana* Babington, Man. Brit. Bot. ed. 3, &c.

Icon. E. B. t. 1808 (*Russelliana*). Forbes, Sal. Wob. t. 28. Kew Bulletin No. 8 (1907), t. opp. p. 312.

Exs. Hb. Linn. No. 91. Leefe, Sal. Brit. exs. Nos. 53–55. Wimmer, Sal. Relict. (Coll. Sal. 9). Billot, No. 1955. Magnier, Nos. 2829–2831. Leefe, Sal. exs. ii. 40. E. F. & W. R. Linton, Nos. 2, 31, 76, 77. Toepffer, No. 25.

A tree 30–80 ft. high, with rough bark, lax in habit, branches spreading-ascending, forming a wide angle (60°–90°) with the trunk; twigs olive, sometimes pubescent at first, with shallow grooves at the buds, sooner or later very fragile at the base; buds rather long, ovate-oblong, glabrescent. Stipules (usually absent) $\frac{1}{2}$-cordate-lanceolate, deciduous, scarce except on late or apoblastic shoots. Leaf-blades 3–5 in. long by $\frac{2}{3}$–$1\frac{1}{2}$ in. broad, narrowly or broadly lanceolate, coarsely serrate, gradually and often obliquely acuminate to a fine point, cuneate at the base, thinly silky at first, soon glabrescent, bright green and shining above, paler and usually glaucous beneath, reddish when young. Catkins coeval with the leaves, narrowly cylindric, dense in flower, rather lax in fruit; peduncles pubescent upwards, leafy, their leaf-blades entire; bracts oblong-lanceolate or lingulate, sub-obtuse, pale straw-coloured, pubescent upwards, soon deciduous; ♂ 1–2 in. long, base of filaments hairy; ♀ $1\frac{1}{2}$–$2\frac{1}{2}$ in. long in flower, –3 in. in fruit; ovaries $\frac{1}{6}$–$\frac{1}{4}$ in. long, lanceolate with ovoid base when fertilised, commonly unfertilised and subulate, gradually tapering into a style as long as or longer than the stigmas; pedicels $1\frac{1}{2}$–3 times as long as the quadrate nectaries.

B. White (*l. c.* p. 368) defines the type as having the ♂ catkins dense-flowered, with stamens conspicuously longer than the bracts; the ♀ catkins with ovaries broader at the base, ovate-lanceolate; and describes var. *britannica* B. White as having lax-flowered ♂ catkins with the stamens little longer than the bracts; ovaries lanceolate-subulate.

There seems to be a difference in the ♂ catkins that amounts to a varietal distinction. But in the ♀ catkins there is reason to suspect that the narrow ovaries of var. *britannica* are unfertilised, and that it is a barren state of the type. The leaves afford no characters in either sex.

S. fragilis is a lowland tree frequent by riversides, recorded from nearly every English county and all but four of the Welsh; occurring through the greater part of Scotland, but doubtfully indigenous beyond the Border; absent from the northern counties, unless where casually planted. Frequent in the South of Ireland, rare in the North, probably introduced in all localities. Europe generally; Asia Minor, Syria, Persia, Caucasus, Armenia, Western and Central Siberia.

S. fragilis × *alba* (p. 19).
× *pentandra* (p. 19).
× *triandra* (p. 20).

SALIX FRAGILIS × PENTANDRA.

Syn. *S. cuspidata* Schultz, Suppl. Fl. Starg. p. 47 (1819). Anderss. Sal. Monogr. 37, and in DC. Prodr. xvi. (2), 208. Hartman, p. 360. B. White, Revision, p. 360.—*S. fragilis-pentandra* Wimm. Schles. Fl. ed. 3, 208.—*S. pentandra-fragilis* Wimm. Sal. Eur. 134.—*S. Meyeriana* Rostkov. in Willd. Berl. Baumz., ed. 2, 427.

Icon. E. B. 2961, 2962 (*S. cuspidata*). Forbes, Sal. Wob. t. 33? (*S. Meyeriana*). Anderss. Sal. Monogr. fig. 26.

Exs. Kerner, Hb. Œsterr. Weiden, Nos. 10, 26. E. F. & W. R. Linton, No. 51. Toepffer, Nos. 33, 35, 128, 179, 275; 276 (as *S. Pokornyi*).

A bush or small tree, 18–25 ft. high, branches with shining grey-brown bark, twigs glabrous; buds oval rounded above, glabrous. Stipules ½-round or ½-cordate-acuminate obliquely pointed. Petioles short, often bearing glands near the blade. Leaf-blades 2–4 in. long, oblong-lanceolate, attenuate to a fine point, cuneate at the base, finely serrate, glabrous, not glutinous (as in *S. pentandra*), scarcely fragrant, shining green above, pale green reticulate with dark green beneath. Catkins intermediate in size, appearing rather late with the leaves or soon after; bracts obovate-oblong rounded above deciduous, ± hairy, yellowish; stamens 3–5 somewhat dense; ovaries conic glabrous, stigmas rather large, style stout, not long; pedicels 2–4 times as long as the short nectaries.

Peaty districts, Salop, Cheshire; Ireland, Kildare, Co. Mayo. Europe: France, Denmark, Sweden, Germany, Austria, Russia.

SALIX FRAGILIS × TRIANDRA.

Syn. *S. alopecuroides* Tausch. Ind. Hort. Canal. (1821).—*S. speciosa* Host. Sal. 2.—*S. amygdalina-fragilis* Wimmer, Flora, xxxi. 333.—*S. fragilis-triandra* Wimmer, Denkschr. Schles. Ges. (1853), 156.—*S. decipiens* B. White, Revision, p. 348.—*S. fragilis* × *amygdalina* Seemen, iv. 211.

Icon. *S. speciosa* Host. Sal. 2, t. 17.

Exs. Baenitz, Herb. Europ. as *S. fragilis* × *triandra* f. *androgyna* Bassum, Hanover, leg. C. Beckmann, with catkins ♀ below and ♂ towards the tip. E. F. & W. R. Linton, No. 78. Toepffer, No. 26.

Shrub or small tree, branchlets dark brown (dry) glabrous shining. Buds glabrous. Stipules rather large, obliquely ½-circular or ½-ovate, bluntly rounded or acuminate. Leaf-blades 3–5 in. long, ½–1⅓ in. broad, oblong-lanceolate or ovate-oblong, ± attenuate, cuneate at the base, sharply serrate with close teeth, shining green above, pale green or sub-glaucous beneath, glabrous.

Catkins 1½–3 in. long; bracts broadly obovate to oblong-spathulate, ± hairy or glabrous, dull yellowish; stamens 2 (or 2–3), filaments hairy at the base, peduncles leafy; ♀ catkins elongate, pedicels at length 3–5 times as long as the short quadrate nectaries, ovaries ovate-conic, usually tapering into a moderate style.

Dr. B. White gives no localities for this hybrid except those for the form which I have placed below as subsp. *decipiens* (Hoffm.). The willow from St. Neots (*l.c.* p. 353), which he thought to be × *S. alopecuroides* Tausch. was proved by cultivation to be *S. triandra* only.

The plant issued as No. 78 in Linton's set of British Willows is from the valley of the Tarrant, Dorset, and though diandrous, fairly represents the hybrid in all other respects. In Herb. Borrer at Kew are two sheets labelled "*Salix* —— cort. decid., Croft, Yorkshire," no date, probably gathered in June, which combine the characters of *S. fragilis* and *S. triandra* very equally, and the plant no doubt is the hybrid between these two. Its distribution in Britain is very restricted:—Dorset, Surrey, Leicester? Yorkshire; in Ireland, near Limerick. Europe: France, Germany, Austria-Hungary, Bohemia, Transylvania.

Subs. S. DECIPIENS (Hoffmann).

Syn. *S. decipiens* Hoffmann, Hist. Sal. vol. 2, fasc. i. 9; Sm. in Rees Cycl. No. 37; Sm. Engl. Flora iv. 183; Leefe, Trans. Bot. Soc. Edinb. i. 160 (1844).—*S. fragilis* × *triandra* B. White, Revision, 348.—*S. fragilis* v. *porcellanea* Baenitz (see exs. below).

Icon. Hoffm. op. cit. t. 31. E. Bot. t. 1937. Forbes Sal. Wob. t. 29.

Exs. Leefe, Sal. exs. No. 50. Fries, Hb. Norm. ix. 61, as *S. fragilis* var. *decipiens.* E. F. & W. R. Linton, No. 30.—*S. fragilis* var. *porcellanea* Baenitz, Baenitz Hb. Europ., from Königsberg.

A small tree; bark rugose, flaking off on old stems; twigs somewhat grooved, red or crimson on the exposed side in early growth, becoming clay-coloured or yellowish-grey by winter and highly polished; buds roundly oval glabrous, many turning black in late autumn or winter. Stipules uncommon, ½-cordate rounded to acuminate. Leaf-blades 3–3½ in. long, glabrous serrate, lanceolate acuminate or attenuate at the tip, parallel-sided in the middle, narrowed or rounded at the base, of a bright oleaginous green above, pale green beneath, often finely reticulate with dark green veins. Catkins few, distant, with a few recurved leaves on the peduncle reticulate beneath; ♂ 1½ in. long, with 2 nectaries, bracts rather short ovate obtuse concave, silky with long hairs; stamens 2 (rarely 3); ♀ catkins at length 1½–2 in., long, slender, pedicels short, the lower ones perhaps eventually 2–3 times as long as the very short nectaries (as in Hoffmann's figure); bracts shortly obovate-oblong, rounded above, ± silky; ovaries glabrous, ovoid-conic gradually narrowed into a short style.

From Perthshire and Fifeshire southwards, probably always planted; sometimes grown as an osier, and known as "White Dutch"; local and not very common. Ireland, near Limerick; no doubt introduced. Probably rare in Europe (confused with *S. fragilis*); Germany.

Only the ♂ plant is known for certain in Britain; Dr. F. B. White (*l.c.* p. 351) claims the ♀ as British, but gives no locality. His herbarium ♀ specimens are probably *S. viridis*, Fr., and his description (p. 352) might be taken from specimens of *S. viridis* also. He rightly identifies the *S. fragilis* var. *porcellanea*, Baenitz, from Königsberg with *S. decipiens*, Hoffm.; and offers a well-reasoned theory in favour of its hybrid origin from *S. fragilis* and *S. triandra*, which is possibly the case, though not without objections. Kerner distinguished three varieties of that hybrid, *viz.*, *S. subtriandra*, *S. alopecuroides*, and *S. Kovatsii*, but *S. fragilis* subsp. *decipiens* agrees with none of these.

iv. ALBÆ.

4. SALIX ALBA L. Sp. Pl. 1021. Hoffm. Sal. I. 41. Wade Essay, 400. Sm. in Rees Cycl. 140. Sm. Engl. Fl. iv. 231. Wimmer, Sal. Eur. p. 16. Syme, E. B. viii. 211. Anderss. DC. Prodr. xvi. (2) 211. B. White, Revision, p. 370. Camus, Monogr. Sal. p. 69. Seemen, iv. 78.

Icon. Hoffm. Sal. tt. 7 and 8; t. 24 f. 3. E. Bot. t. 2430. Forbes, Sal. Wob. t. 136. Kew Bulletin, No. 8 (1907) plate opp. p. 313. Camus, Atlas, Pl. 2.

Exs. Hb. Linn. Nos. 11 (1), 77, 105. Fries, Hb. Norm. i. 62. Magnier, No. 2035. Leefe, Sal. Brit. exs. Nos. 56–59. Kerner, Hb. Œsterr. Weiden, 18. Wimmer, Sal. Relict. (Coll. Sal. 12 12b; Herb. Sal. 136). Billot, 847. E. F. & W. R. Linton, No. 3. Toepffer, Nos. 1, 101–103, 146.

A tree 30–80 ft. high, branches erect-ascending, forming a narrow angle with the trunk (30°–50°), bark not rugged; twigs tough, not fragile at the base, silky-pubescent, at length glabrous; buds oblong-oval, pubescent often through the winter. Stipules lanceolate, soon deciduous. Petioles rather short. Leaf-blades 2½–4 in. long, oblong to narrowly obovate lanceolate, evenly acuminate or attenuate finely serrate, silkily pubescent, hairs adpressed partially persistent. Catkins coeval with (or the ♂ slightly preceding) the leaves, dense-flowered, on leafy peduncles, their leaves entire; bracts pale straw-yellow narrow oblong, hairy or woolly towards the base, glabrous upwards outside; ♂ 1–1½ in. long, filaments hairy in the lower half; ♀ elongate in fruit, 2–2½ in. long, becoming rather lax; ovaries ovoid-conic, abruptly obtuse, glabrous subsessile, the lower ones developing short pedicels about as long as the quadrate nectaries; stigmas subsessile or with very short style, rather thick, deeply divided.

S. alba has typically olive twigs, persistently clothed with silky hairs on both sides. There are two forms or varieties.

1. Var. *cærulea* Sm.

Syn. *S. alba β cærulea* Smith, Engl. Fl. iv. 231. Sm. in Rees Cycl. 141. Syme, E. B. ed. 3, viii. 211.—*S. alba* f. *cærulea* Wimmer, Sal. Eur. 18. B. White, Revision, p. 370.—*S. alba, C. cærulea,* Camus, Monogr. 75.—*S. alba, D. cærulea,* Seemen, iv. 80.

Icon. E. Bot. t. 2431. Forbes, Sal. Wob. No. 137.

Exs. Hb. Smith, " Mr. Crowe's garden." Magnier, No. 2839 (*S. alba* var. *virescens* F. Gérard). Toepffer, No. 101.

A quick-growing tree, making valuable timber. Leaf-blades of a bluish-green, or bluish-grey beneath; pubescence somewhat deciduous. Smith says the " under side of the leaves loses, at an early period, most of its silky hairs." This glabrescence is perhaps more strongly marked in East Anglia than elsewhere; trees planted in Norfolk by E. R. Pratt, Esq., were so glabrate that, in the absence of fruit catkins, specimens were mistaken for *S. viridis* Fr. (see his paper on the Cricket-bat Willow, sub nom. *S. viridis* Fr. in Journ. Roy. Agricult. Soc. vol. 66 (1905), pp. 19–34).

S. alba var. *cærulea* gives the best cricket-bat timber, justifying Smith's remark, " its qualities are of the highest importance " (Engl. Fl. iv. 232), and is the true " close-bark " of bat makers. *S. alba* comes next in value, then *S. viridis*, while *S. fragilis*, the " open-bark " of the makers in reference to its rugged trunk, is barely serviceable for the poorest bats (see " The Cricket-bat Willow," by W. T. Bean, *Kew Bulletin*, 1907, No. 8).

2. Var. *vitellina* (Golden Willow).

Syn. *S. vitellina* L. Sp. Pl. 1016. Sm. Fl. Brit. 1050; Engl. Fl. iv. 182. Wade, Essay, 102.—*S. alba* f. *vitellina* Wimmer, Sal. Eur. 18.—*S. alba, D. vitellina* Camus, Monogr. 75.—*S. alba β vitellina* Anderss. DC. Prodr. xvi. (2), 211. Syme, E. B. viii. 211. *S. alba* var. *vitellina* Seemen, iv. 80.

Icon. Hoffm. Hist. Sal. t. xi. xii. 24, f. 1. Forbes, Sal. Wob. 20. Engl. Bot. t. 1389.

Exs. Séringe 19. Wimmer, Sal. Relict. (Coll. Sal. 12, c, d.). Leefe, Sal. exs. ii. 34. E. F. & W. R. Linton, No. 32. Toepffer, No. 103.

A tree 30–50 ft. in height, with slender flexible branches which are soon glabrous, somewhat shining, yellowish, buff, reddish-yellow or red through their first winter. Leaf-blades pubescent at first but soon glabrescent and green above, more densely pubescent beneath at first, at length thinly hairy with appressed hairs and decidedly glaucous. Catkins ♀ elongate, bracts long and narrow, about as long as the mature ovaries. From the Clyde southwards to Cornwall and Kent; Perthshire; usually planted as an ornamental shrub or as an osier.

S. alba, not recorded for some few counties in Wales and the North of Scotland, is otherwise generally distributed through the British Isles. Often planted, it is also sometimes self-sown, and may be native in some parts of the East of England. It occurs through almost the whole of Europe; Asia Minor, Caucasus, Siberia; N. Africa; N. America (planted).

S. alba × *fragilis* (p 19).
× *pentandra* (p. 19).
× *triandra* (p. 20).

SALIX ALBA × FRAGILIS.

Syn. *S. fragilis* Sm. Fl. Brit. 1051; Engl. Fl. iv. 185; Sm. in Rees Cycl. 38.—*S. fragilis-alba* Wimmer, Sal. Eur. 133.—*S. viridis* Fries, Anderss. Monogr. 43, n. 29; DC. Prodr. xvi. (2) 210. Syme, E. B. ed. 3, viii. 207 (letterpress, not plate). Hartman, 361. B. White, Revision, 364, 371.—*S. subdola* B. White, *ibid.* 354.

Icon. E. Bot. t. 1807 (as *S. fragilis*). Camus, Atlas, Pl. 22, A–D.

Exs. Fries, Hb. Norm. i. 61 (fol.). Leefe, Sal. exs. ii. 31, 32, 40. E. F. & W. R. Linton, No. 33. Toepffer, No. 2.

A variable hybrid lying between *S. alba* and *S. fragilis*; differing from *S. alba* in the branches being more spreading, buds sooner glabrescent, leaf-blades rather less silky from the first, lighter green, ± glabrescent, somewhat more coarsely serrate. In the ♀ catkins the pedicels are eventually about $1\frac{1}{2}$ times the length of the nectaries, the ovaries more gradually acuminate, but not tapering into the moderate styles.

From *S. fragilis* it may be distinguished by some of the following characters: in *S. viridis* the branches less spreading, the twigs more flexible and tougher, less ready to fracture off at the base, buds longer more pubescent; leaf-blades darker duller green, with more persistent hairs, always somewhat silky when young, more finely serrate. In the catkins the bracts may be less pilose on the outside upwards, ovaries $\frac{1}{6}$–$\frac{1}{5}$ in. long ovate-conic, obtuse not tapering into the styles, pedicels and styles shorter.

These evidences of the two parents are not equally present in all cases; sometimes intermediate examples occur, sometimes the vegetative parts show one parent more clearly and the reproductive organs the other. But usually the shape of the ovaries and the comparative length of the pedicels and nectary are ± intermediate.

A lowland tree, of little value as timber, *S. viridis* is recorded for several counties from Cornwall and Kent to Worcestershire and Leicestershire; in Scotland for Dumfriesshire, Roxburgh, Edinburgh and Perthshire. In Europe it has been found in most of the countries of Central Europe, from France to Russia.

SALIX ALBA × PENTANDRA Kerner, Hb. Œsterr. Weiden, No. 27.

Syn. *S. Ehrhartiana* Sm. in Rees Cycl. No. 10.—*S. tetrandra* Fries, Novit. Fl. Suec. Mant. i. 41 (1832, &c.).—*S. hexandra* Ehrh. B. White, Revision, 361 (but *S. hexandra* is now regarded as *S. alba* × *fragilis* × *pentandra*. Seemen, iv. 208).

Exs. Kerner, Hb. Œsterr. Weiden 27 (as *S. Ehrhartiana*).—*S. hexandra* ♂, Tirol. centr., near Gasteig, Huter in Herb. Kew. Toepffer, No. 51.

A small tree, with branchlets pubescent only while very young, soon glabrous, dark olive brown ± polished by the end of the first year; buds ovate-oblong, glabrous, shining. Stipules small, ovate-acuminate, soon deciduous. Leaf-blades 2–4 in. long, sometimes ovate-oblong, usually oblong-lanceolate attenuate, narrowed to the petiole, which is short with 2–4 (or 0) glands, finely serrate, ± shining above, paler or glaucous-green and finely reticulate beneath, pubescent at first, soon glabrous. Catkins 1–1½ in. long, rather late in appearing, slender or medium broad, bracts ovate-oblong or oblong, obtuse, subglabrous to subvillous, yellowish; stamens 3–6, filaments hairy at the base; ovaries ovate-conic, lower ones rather lax; style distinct, rather stout; pedicels as long as the nectaries or a little longer.

Specimens of this rare hybrid are in existence from Kent (Hb. F. J. Hanbury), Essex, Hunts? (Hb. E. F. Linton), and Westmorland (Hb. C. E. Salmon and Hb. A. Ley). In Scotland, the Duddingston (Edinburgh) plant described by Dr. B. White (*l. c.* p. 361) appears likely to be this hybrid; but the Restenet plant (foliage only) shows little evidence of *S. pentandra.* Ireland, near Limerick. Europe: Germany, Lower Austria, Tirol.

SALIX ALBA × TRIANDRA.

Syn. *S. undulata* Ehrh. Beitr. vi. 101 (1791). Syme, E. B. viii. 213.—*S. lanceolata* Sm. Engl. Fl. iv. 168. Leefe, in Trans. Bot. Soc. Edinb. i. 157.—*S. triandra-viminalis* var. *undulata* Wimmer, Flora, xxxii. 39 (1849).—*S. triandra-alba* Wimmer, Sal. Eur. 144.—*S. amygdalina* × *alba* Seemen, iv. 206. [*S. subdola* B. White, Revision, 354, is by his herbarium specimens a form of *S. viridis* Fries.]

Icones. Forbes, Sal. Wob. 15. E. Bot. 1436, 2061.

Exs. Hb. Smith. Reichenb. Fl. Germ. exs. No. 960 (Hb. Kew). Leefe, Sal. exs. ii. 37; Sal. Brit. exs. No. 9. Magnier, Fl. Select. exs. 2293. Hb. B. White, Nos. 264, 286, 288, 292. E. F. & W. R. Linton, No. 29. Toepffer, Nos. 3*a*, 4.

Arborescent shrub with olive-brown branches, bark flaking off the trunk twigs, pubescent at the very first, soon glabrescent. Stipules ½-cordate-lanceolate. Leaf-blades 3–5 in. long, oblong-lanceolate, usually narrow attenuate to a fine tip, narrowed to the moderate petiole, finely and sharply serrulate, dull green hardly shining above, pale green beneath, silkily pilose at first, soon glabrous. Catkins 1½–2½ in. long, coeval with the leaves on leafy peduncles; bracts yellowish or greenish-yellow, concolorous, ovate or narrowly obovate roundly obtuse above, concave, slightly hairy at the base, more so at the bearded tip; ovaries ovate-conic, glabrous; nectaries broad ½-clasping the somewhat longer pedicels; styles distinct, short, rather thick; stigmas usually bifurcate.

S. undulata Ehrh. has been confused by many writers with *S. hippophaefolia* Thuill. (*S. triandra* × *viminalis*), there being a good deal of similarity. Wimmer says that Ehrhart himself mixed them, which would account for the ovaries having been described by some authors as pubescent; whereas Smith, who had seen Ehrhart's original specimens, declares they were glabrous, as they were in his *S. lanceolata.* Wimmer also relates that he himself had confused them previously, but confesses his mistake (Sal. Eur. p. 145), and declares the two plants to be distinct. He makes the glabrous ovaries of *S. undulata* the chief distinction; but the concolorous bracts not blackened at the tip, and the sharply serrulate leaf-margin are equally good evidence against this plant being derived from *S. viminalis* or being identical with *S. hippophaefolia.* Dr. B. White adopted the views of Andersson and others that *S. undulata* Ehrh. was one of the forms of *S. triandra* × *viminalis*, which Andersson combined under the name of *S. multiformis* Doell; and his section headed × *S. undulata* (*l. c.* pp. 355–359) calls for the caution that *S. undulata* Ehrh. (*S. lanceolata* Sm.) is quite distinct from the group of *S. triandra* × *viminalis* hybrids.

S. undulata occurs from Surrey and Essex to Yorkshire, in Roxburgh, Berwick and Perthshire, but being found in one sex only is no doubt planted, being often propagated as an osier. Europe Central from France to Russia, and Scandinavia.

[Salix babylonica L. Sp. Pl. 1017 (Weeping Willow). Anderss. DC. Prodr. xvi. (2), 212. Seemen, iv. 82.—*S. propendens* Séringe, Essai, 73.

Icon. Forbes, Sal. Wob. t. 22. Camus, Atlas, Pl. I. a–e.

A tree with long branches spreading from a divided trunk, recurving and drooping almost to the ground. Stipules narrowly lanceolate, soon deciduous. Leaf-blades narrowly lanceolate attenuate, finely dentate, glabrous, ± glaucous beneath. Catkins appearing with the leaves or soon after on leafy peduncles, cylindric, slender; bracts ovate-lanceolate, glabrescent; ovaries sessile ovate-conic, glabrous; style very short.

Planted as an ornamental tree; allied to *S. alba*, with which it hybridizes, but differing in its glabrous twigs, buds and leaves, narrower catkins, and drooping habit. Native in Central Asia from N. Persia to the Caucasus, it has been introduced for the beauty of its pendulous branches into all parts of the world.]

[Salix daphnoides Villars, Dauph. 765. Wimmer Sal. Eur. 4. Anderss. DC. Prodr. xvi. (2), 261.

Icon. Hoffm. Hist. Sal. t. 32. Forbes, Sal. Wob. 26.

Exs. E. F. & W. R. Linton, No. 4. Toepffer, No. 23.

A large bush or small tree, branches pubescent when young, soon glabrous turning pruinose, at length reddish-brown shining. Leaf-blades oblong or oblong-lanceolate, acute, subentire or obscurely gland-serrate, glabrous or nearly so, ± glaucous beneath. Catkins appearing before the leaves, sessile, densely silky, about 1½ in. long, ♂ ¾ in. broad, filaments adnate at the base; ♀ about ½ in. broad, pedicels about equalling the shortly oblong nectaries; bracts oblong-obovate bluntly pointed, clothed with long silky hairs; ovaries ovate-conic glabrous, stigmas oblong entire, as long as the long styles. Not indigenous; recorded from Great Ayton, Yorks, and found in some quantity by W. R. Linton, 1898, on a bank by Chinley Station, Derbyshire, but since destroyed; near

Leicester; near Southport, Lancashire (as var. *pomeranica* = *S. pomeranica* Willd. Enum. Pl. Hort. Berol. Suppl. 1813, 66, a form with narrower leaves and more slender catkins); Perthshire. Europe: France, Scandinavia, Italy, Russia, Siberia; Central Asia.]

v. PURPUREÆ.

5. SALIX PURPUREA L. Sp. Pl. 1017. Sm. Fl. Brit. iii. 1039; Engl. Fl. iv. 187. Wade, Essay, 127. Wimmer, Sal. Eur. 29. Anderss. DC. Prodr. xvi. (2), 306. Syme, E. B. viii. 217. B. White, Revision, 447. Camus, Monogr. 98.—*S. Lambertiana* Sm. Fl. Brit. iii. 1041.

Icon. Hoffm. Hist. Sal. t. 1; t. 5, f. 1; t. 23, f. 1. E. Bot. t. 1343, 1388. Forbes, Sal. Wob. t. 1, 3. Camus, Atlas Pl. 7.—*S. Lambertiana* Sm. E. Bot. t. 1359.—*S. Woolgariana* Borr. E. B. S. t. 2651.

Exs. Hb. Linn. No. 17 (1, 2), 17 (f, g), 18, 19, 20. Leefe, Sal. Brit. exs. Nos. 11, 12, 13, 75, 76. Magnier, No. 3356. E. F. & W. R. Linton, Nos. 34, 80; and No. 5 (var. *Woolgariana*). Toepffer, Nos. 36, 37, 48, 49, 137.

A shrub 4–10 ft. high, glabrous, or very nearly so, with straight tough branches often purplish at first, then grey or olive-grey, smooth, rather shining; buds oblong pointed. Stipules small narrow oblong, rather scarious, soon deciduous, seldom found. Leaf-blades 2–4 in. long, often opposite towards the top of the branchlets, broadly or narrowly oblanceolate, less commonly oblong-obovate, acute or acuminate, attenuate-cuneate at the base, finely and acutely serrate in the upper part, dull green above, pale or glaucous green beneath, coriaceous, glabrous (or pubescent just at first); turning black when being dried. Catkins $\frac{3}{4}$–1$\frac{1}{4}$ in. long, preceding the leaves in March or April, subsessile with a few small leaves at the base, slender, erect then often spreading or recurved, dense-flowered; bracts obovate rounded above almost villous, reddish below the blackened tip, persistent; filaments adnate, woolly-pilose at the base, anthers 4-lobed having four chambers, purple or reddish; ovaries broadly ovoid, obtuse, tomentose, sessile or subsessile, stigmas also sessile or subsessile, short, thick, spreading, usually not divided and often with a purple tinge.

British botanists in the past restricted *S. purpurea* to the narrower-leaved form with spreading or ascending branches and slender catkins, and distinguished two forms of robuster and more upright growth and broader foliage, *viz.* var. *Woolgariana* (*S. Woolgariana* Borr. *l.c.*) with yellowish twigs and broadly cuneate-obovate leaves; and var. *Lambertiana* (*S. Lambertiana* Sm. *l. c.*) with purplish twigs and leaf-blades broadly oblong, slightly enlarged upwards from the broad base. But these forms shade into one another in nature, and are of little use unless for classifying specimens in the herbarium by the breadth and shape of the leaf, and have latterly been regarded only as synonyms of the species *S. purpurea.*

About *S. Helix* L. there has always been some doubt. According to Fries & Koch (Fl. Germ. et Helv. ed. 2, p. 744) it was a form of *S. purpurea.* Wimmer, thinking Linnæus could not have described such a well-marked willow as *S. purpurea* under two names, makes *S. Helix* a synonym of his *S. viminalis-purpurea* (Sal. Eur. pp. 33, 173). Each of these lines has been followed in different Floras, Syme (*l. c.* p. 221) placing γ *Helix* under *S. rubra,* while Andersson (*l. c.* p. 307) and Babington (Man. ed. 9, p. 79) place *S. Helix* (L.) as a variety under *S. purpurea.* The confusion is reflected very commonly in British herbaria. The name *S. Helix* therefore disappears, as an ambiguity, *S. rubra* Huds. being generally accepted as the name for the hybrid *S. purpurea* × *viminalis.*

S. purpurea is a useful osier for the finer sorts of basket-work, &c., and several varieties are grown in the Thurmaston osier fields. The bitterness of the bark to some extent protects it against rodents. While often planted in marshy holts and hedges, it is generally distributed, and native through the eastern and central parts of Great Britain, from the South Coast northwards to Aberdeenshire ; and is reputed native in many parts of Ireland, where it occurs rather generally, but as introduced into the northern and south-western counties. Through Central Europe in its widest sense ; and through Central Asia from Asia Minor to Japan. N. Africa ; N. America (planted).

S. purpurea × *aurita* (p. 23).
× *aurita* × *cinerea* (p. 24).
× *aurita* × *phylicifolia* (p. 24).
× *cinerea* (p. 25).
× *phylicifolia* (p. 26).
× *repens* (p. 26).
× *viminalis* (p. 27).

SALIX AURITA × PURPUREA.

Syn. *S. aurita-purpurea* Wimmer, Fl. Schles. 2 Aufl. Nachtr. (1845) 478 ; Sal. Eur. 165.—*S. dichroa* Döll. 511. B. White, Revision, 452.—*S. Pontederana* δ *dichroa* Anderss. DC. Prodr. xvi. (2), 312.—*S. aurita* × *purpurea* Camus, Monogr. 283. Seemen, iv. 299.

Icon. Camus, Atlas t. 27, fig. A–J.

Exs. Kerner exs. Austr. Hung. 1467, Hb. Œsterr. Weiden, No. 22. Wimmer, Sal. Relict. (Herb. Sal. 61 ; Coll. Sal. 151c, 152, 153, 155). Leefe, Sal. exs. iii. 59. Hb. B. White, Nos. 207, 408, 409. Toepffer, Sal. exs. Nos. 10, 55, 113.

A much branched shrub, 3–6 ft. high, with straight slender shoots, ± pubescent at first, soon glabrous, dark purplish brown. Buds glabrescent. Stipules $\frac{1}{2}$-cordate- or $\frac{1}{2}$-broadly-ovate-acuminate. Leaf-blades small, oblong-lanceolate or obovate-oblong acute, narrowed below, hardly rugose, dentate in the upper half, pubescent at first, soon glabrescent, ± glaucous with nerves prominent beneath, usually blackening somewhat. Catkins about 1 in. long, preceding the leaves in April, dense-flowered ;

bracts oblong or obovate-oblong, subobtuse, ferruginous below the blackened top, silkily pubescent; ♂ with filaments combined below and pubescent at the base, anthers purplish; ♀ peduncled, with a few small leaves; ovaries ovate-conic becoming ovate-lanceolate, tomentose; pedicels 2–3 times as long as the quadrate nectaries; stigmas oval-oblong, sessile or subsessile.

Like *S. cinerea* × *purpurea* but with more slender and quickly glabrescent twigs, buds shorter, leaf-blades rather smaller, more dentate, and somewhat rugulose at first; catkins and ovaries more slender.

First found at Rothbury, Northumberland, and issued by Rev. J. E. Leefe as *S. Pontederana*?, to which it is closely allied; near Thornhill, Dumfriesshire; Perthshire (Hb. B. White). Europe; France, Germany.

SALIX AURITA × CINEREA × PURPUREA Scholz in Sched. Fl. Silesiaca (1899).

Syn. *S. confinis* Camus, Monogr. ii. 280 (1905).—*S. cinerea* × *aurita* × *purpurea*? Seemen, iv. 300.

Exs. Hb. B. White, Nos. 191, 438? 439 (as *S. sordida*).

Like *S. sordida* Kern. (*S. cinerea* × *purpurea*), as it was named by Dr. F. B. White, but showing besides evidence of *S. aurita* in the more slender twigs, the short subglobose buds, the obliquely-pointed stipules, and the oblong-spathulate floral bracts which are ferruginous below the blackened tips; fl. April–May.

Riverside near Perth where *S. aurita*, *S. purpurea* and × *S. sordida* grow together. Europe: Silesia.

SALIX AURITA × PHYLICIFOLIA × PURPUREA.

Syn. *S. sesquitertia* (*S. purpurea* × *aurita* × *phylicifolia*) B. White in Ann. Scot. Nat. Hist. (1892), 66.

Exs. E. F. & W. R. Linton, No. 52.

A shrub 3–5 ft. high, with slender branches slightly pubescent when young, soon glabrous, at length dark brown and somewhat shining. Stipules small roundish or reniform, rarely persistent. Leaf-blades 1½–2½ in. long, oblong-obovate rather abruptly pointed, crenate-serrate, rugulose when young, glaucous beneath, thinly pubescent at first, soon glabrous. Catkins ¾–1¼ in. long, fl. May, subsessile, monœcious with ♂ flowers at and near the top and 3–5 small leaves at the base, filaments connate through their whole length, anthers 4-chambered; bracts oblong-obovate rounded above, reddish-brown below the blackened tip, clothed with long white pubescence; ovaries conical, tomentose, shortly pedicelled; pedicels pubescent, about twice as long as the short nectaries; stigmas usually entire, rather shorter than the moderate style.

Banks of the River Nith, near Sanquhar, Dumfriesshire; one bush only, discovered by Mr. James Fingland.

In foliage this willow is much like *S. aurita* × *phylicifolia*, the *S. purpurea* element being conspicuous in the catkins only. The monœcious flowers are of course no part of the characters of × *S. sesquitertia*; the condition is one that occurs now and then in some hybrids, seldom in undiluted species.

Endemic in Scotland.

SALIX CINEREA × PURPUREA.

Syn. *S. cinerea-purpurea* Wimmer, Fl. Schles. 2 Nachtr. 477 (1845); Sal. Eur. 162.—*S. Pontederana* Schleicher, Cat. Pl. Helv. (1800); Döll. Fl. Baden, 510.—*S. sordida* Kerner, Niederoestr. Weid. 135 (1859). B. White, Revision, 450.—*S. Pontederana* γ *sordida* Anderss. DC. Prodr. xvi. (2), 312.—*S. cinerea* × *purpurea* Camus, Monogr. 275. Seemen, iv. 294.

Icon. Forbes, Sal. Wob. t. 43.

Exs. Wimmer, Sal. Relict. (Hb. Sal. 10, 59, 100; Coll. Sal. 145, 147, 148); Magnier, 4077 (*S. atrocinerea* Brotero). Hb. B. White, Nos. 126, 180, 182, 202, 232. E. F. & W. R. Linton, No. 81. Toepffer, Nos. 21, 121.

A shrub 5–9 ft. high, with rather long straight branches and many branchlets, pubescent only at first; buds glabrescent. Stipules small rounded. Leaf-blades 1½–2½ in. long, obovate-acuminate to oblong-lanceolate, crenulate, pubescent while young, of a slightly shining green becoming glabrous above, glaucous or ashen and glabrescent beneath or with some persistent pubescence. Catkins 1–2 in. long, fl. April, subsessile with obovate obtuse silky bracts; stamens ± connate, anthers usually tinged with red; ovaries conic, grey-tomentose; pedicels rather short, nectaries shorter; stigmas short, subsessile.

This hybrid differs from *S. purpurea* in stouter twigs which are more branched, young leaves pubescent, stipules ± rounded, filaments not wholly united, and ovaries somewhat elongate and pedicelled. It differs from *S. cinerea* in the reduced stipules, glabrescent twigs and buds, and leaves soon glabrous; shortly conic ovaries shortly pedicelled, filaments ± connate, and anthers tinged with red.

Wimmer describes two main variations: 1. *cinerascens* (nearer *S. cinerea*), and 2. *glaucescens* (nearer *S. purpurea*, perhaps *S. Pontederana* Koch); and Andersson follows Wimmer in this subdivision. *S. Pontederana* Schleich. is said by Kerner to have been applied to hybrids of *S. purpurea* with others of the *Capreæ*, and should have been avoided as a doubtful name on account of this confusion; but it is employed by Andersson in this aggregate sense, to include hybrids of *S. purpurea* with four of the *Capreæ* (DC. Prodr. *l. c.*). "As, however, he had not united these species, it is scarcely justifiable to unite the hybrids, if it is at all possible to distinguish them; and he himself has kept them separate as varieties" (B. White, Revision, p. 450).

Under *S. sordida* Kerner, the name he prefers for this hybrid, though it is ante-dated by *S. cinerea-purpurea* Wimmer, B. White describes briefly var. *rubella* (*l. c.* p. 451), which he suspects may be a cross of *S. rubra* (with which it grows) and *S. cinerea*, i. e. *S. purpurea* × *S. viminalis* × *cinerea*. Leaves and habit of *S. purpurea*; catkins small or of medium size; stamens free; anthers orange-red, turning fuscous when the pollen is shed; leaf-blades oblanceolate, dark green and shining above, glaucous beneath, soon glabrous, pubescent only while quite young; branches straight slender, pubescent at the very first, soon glabrous.

S. Rakosiana Borbas, Endeszet Lapok et in Œsterr. Bot. Zetschr. (1883), 359, was issued as a form of this hybrid on the *S. purpurea* side. It is perhaps the combination Dr. White suspected for his var. *rubella.* No. 1466 in Kerner's Fl. exs. Austr. Hung., labelled "*S. Rakosiana* (*subcinerea* × *purpurea*) Borbas, Hungaria pr. Budapest, legit Borbas," ex Hb. C. Bailey, shows *S. viminalis* very plainly in the leaves and in the moderate style, while the small stigmas recall *S. cinerea.*

S. cinerea × *purpurea* has been found plentifully along the banks of the River Tay near Perth (numerous specimens in Hb. B. White), and in Dumfriesshire (Hb. Fingland, No. 208). Europe: France, Germany, Denmark, Scandinavia, Switzerland, Lower Austria, Tirol, Bohemia, Hungary.

SALIX PURPUREA × PHYLICIFOLIA.

Syn. *S. secerneta* (*S. purpurea* × *phylicifolia*) B. White in Ann. Scot. Nat. Hist. (1892), 65.

Exs. E. F. & W. R. Linton, No. 82.

A low spreading bush, with straight slender glabrous rather shining dark brown branches; buds oblong glabrous. Stipules ½ roundish-lanceolate (seen only in cult. specimens). Leaf-blades 1¼–2 in. long, ovate- or oblong-lanceolate, finely serrate, glabrous unless while very young, pale green to glaucous beneath, not discolouring when dried. Catkins small, narrow, fl. in May, shortly peduncled with 2–3 small leaves below; ♂ ½–¾ in. long, bracts oblong-spathulate to lanceolate, very dark (nearly black) above, clothed with long white hairs; filaments adnate (on one bush) or united only near the base (on another); nectaries short quadrate; ♀ 1–1½ in. long, bracts shortly oblong hairy; ovaries long-conic grey-tomentose, shortly pedicelled; nectaries broad, shorter than the pedicels; stigmas shorter than the moderately long styles.

Banks of the River Nith, near Sanquhar, Dumfriesshire, where first discovered by James Fingland. Easily overlooked as *S. phylicifolia* in leaf, but exhibiting unmistakable evidence of *S. purpurea* in the flowers.

Endemic in Scotland.

SALIX PURPUREA × REPENS.

Syn. *S. Doniana* Smith, Engl. Fl. iv. 213. Anderss. DC. Prodr. xvi. (2), 315. Syme, E. B. viii. 219. B. White, Revision, 452.—*S. repens-purpurea* Wimmer, Fl. Schles. 2 Nachtr. 482 (1845); Sal. Eur. 171.

Icon. E. B. S. t. 2599. Forbes, Sal. Wob. t. 85. Camus, Atlas t. 27, f. K–P.

Exs. Wimmer, Sal. Relict. (Herb. Sal. 19, 54; Coll. Sal. 236–238, 241). Leefe, Sal. exs. 1, 99. Baenitz, Hb. Eur. leg. Schatz. E. F. & W. R. Linton, Nos. 6, 83. Toepffer, Sal. exs. No. 77.

A shrub 3–5 ft. high, with straight slender reddish-brown branches, soon glabrous; buds puberulous, glabrescent. Stipules small, linear or narrow, fugitive. Leaf-blades ½–2 in. long, often in pairs, usually oblanceolate or oblong-obovate to oblong-lanceolate, tip acute, narrowed to the base, with revolute margin, entire or denticulate in the upper half, glaucous or livid-glaucous and pubescent beneath, sooner or later glabrous, shortly petioled. Catkins about ¾ in. long, coming before the leaves in April or May, subsessile with a few small basal leaves; bracts obovate, rounded or obtuse, fringed with silky hairs; filaments ± united, slightly pilose at the base; anthers brick-red shading into orange; ovaries conic, tomentose; pedicels 1–3 times the length of the quadrate nectaries; styles very short.

Only the ♀ plant has been discovered wild in Britain. Smith's plant was said to come from Scotland, but the locality is unknown. Dr. F. B. White rediscovered it for Scotland, near Pitlochry, Perthshire. Specimens of the ♂ plant were issued in the Set of British Willows (No. 83), from a plant made by design in a Bournemouth garden. Europe: France, Germany, Switzerland, Lower Austria, Tirol, Bohemia, Moravia, Galicia, Poland.

SALIX PURPUREA × VIMINALIS.

Syn. *S. rubra* Hudson, Fl. Angl. 364 (1762). Sm. Engl. Fl. iv. 191; in Rees Cycl. 50. Syme, E. B. viii. 220. B. White, Revision, 448.—*S. fissa* Ehrh. Arbor. 2°, 29. Hoffm. Hist. Sal. 61. Séringe, Essai, 32.—*S. Helix* L. Sp. Pl. 1017.—*S. Helix* Sm. Engl. Fl. iv. 188.—*S. rubra* α *viminaloides* Gr. & Godr. iii. 129. Anderss. in DC. Prodr. xvi. (2), 307.—*S. viminalis-purpurea* Wimmer, Fl. Schles. (1845); Sal. Eur. 173.

Icon. E. Bot. 1145. Forbes, Sal. Wob. t. 6. Hoffm. Hist. Sal. t. xiii. f. 1, 2; xiv. f. 34. Camus, Atlas Pl. 25, f. E–J.

Exs. Leefe, Sal. Brit. exs. Nos. 15, 16. Wimmer, Sal. Relict. (Hb. Sal. 134; Coll. Sal. 234, 235b). Billot, No. 286. E. F. & W. R. Linton, No. 7. Toepffer, Sal. exs. Nos. 78–80, 140.

A shrub 5–8 ft. high, with long shoots turning yellowish with glabrescence, pubescent at first; buds oval-oblong, puberulous. Stipules linear or narrow-lanceolate, small scarious, soon fugitive. Leaf-blades 3–6 in. long, on short petioles, lanceolate or oblanceolate attenuate to a fine point, crenate-denticulate or faintly toothed, silkily pubescent at first, then green and glabrous above when full-grown; paler or glaucous-green and glabrescent beneath, or at times with some persistent pubescence. Catkins ¾–1¼ in. long, fl. March or April, slightly preceding the leaves, dense-flowered, peduncles short, with some small narrow leaves; bracts obovate-oblong, clothed with long silky hairs; ♂ ovoid-oblong, filaments ± connate, anthers reddish at first; ♀ cylindric; ovaries ovoid-conic sessile, tomentose, with oblong nectaries exceeding their base; style moderate, about as long as the linear undivided stigmas.

S. rubra differs from *S. purpurea* in the long leaf-blades, silky at first and less distinctly serrate, in the distinct style and equally long stigmas. It differs from *S. viminalis* in the glabrescent more denticulate leaf-blades with less revolute margins, the more slender catkins, the connate stamens, and anthers tinged with red, the smaller ovaries with short styles and stigmas.

Var. *Forbyana* (Smith).

Syn. *S. Forbiana* Sm. Fl. Brit. 4; Engl. Fl. iv. 191; Sm.

in Rees Cyclop. 49.—*S. rubra* Huds. *β Forbyana* Syme, E. B. viii. 221 (1868). B. White, Revision, 449.—*S. rubra β purpureoides* Gr. & Godr. iii. 129. Anderss. DC. Prodr. xvi. (2) 308.

Icon. E. Bot. t. 1344. Forbes, Sal. Wob. t. 5. Camus, Atlas, pl. 25, K, L.

Exs. Hb. Smith (a type specimen). Leefe, Sal. exs. i. 23. Magnier, No. 3357 (♀ with double ovaries). Wimmer, Sal. Relict. (Hb. Sal. 15; Coll. Sal. 235). E. F. & W. R. Linton, No. 35.

A broader-leaved form has long been distinguished by British botanists under the name of *S. Forbyana* Smith (afterwards reduced to a variety), having obovate-oblong leaf-blades more shortly acuminate, with a flatter and more serrate margin, sooner glabrous, than *S. rubra*; darker and less pubescent catkins; styles usually shorter. This is more nearly allied to *S. purpurea* and to its broad-leaved varieties. *S. rubra* was restricted to forms with longer narrower leaves, often more pubescent beneath, margins more revolute and crenate-serrate, more silky catkins, styles longer, forms in fact more nearly allied to *S. viminalis.*

Grenier made a somewhat similar division of this hybrid into two main varieties, viz., var. *purpureoides*, which includes *S. Forbyana* Sm., and is nearer *S. purpurea*; and var. *viminaloides*, which includes our *S. rubra* forms nearer to *S. viminalis*. Andersson adopted Grenier's division. Either of these may be convenient for arranging collections, but no definite line can be drawn between the two variations.

As to *S. Helix* L., while Smith connected it with *S. rubra*, it is quite uncertain what Linnæus meant by it.

This hybrid is recorded for numerous counties in England, from Yorkshire and Westmorland southwards; a valuable osier, it is frequently planted in osier-beds, and elsewhere usually introduced, as it certainly is in a few Scotch counties—Peebleshire, Selkirkshire, Lanarkshire, Perthshire, and Dumbartonshire; also in Co. Leitrim and Sligo, Ireland. Central Europe—from France and the North of Spain to Russia.

vi. Viminales.

6. Salix viminalis L. Sp. Pl. 1021. Sm. Fl. Br. iii. 1070; in Rees Cycl. 134. Wade, 371. Séringe, 35. Sm. Engl. Fl. iv. 228. Wimm. Sal. Eur. 36. Hartman, 363. Anderss. DC. Prodr. xvi. (2) 264. Syme, E. B. viii. 223. B. White, Revision, 413. Camus, Monogr. 214. Seemen, iv. 173.—*S. longifolia* Lam. Fl. Franc. ii. 232 (1778).—*S. folio longissimo* Dill. in R. Syn. ed. 3, 450.

Icon. Hoffm. Hist. Sal. t. 2, f. 1, 2. E. Bot. 1898. Forbes Sal. Wob. t. 133. Camus, Atlas, pl. 21, A–G.

Exs. Hb. Linn. No. 76 b, c. Billot, 1958. Leefe, Sal. Brit. exs. Nos. 17–24. Wimmer, Sal. Relict. (Hb. Sal. 126, 127; Coll. Sal. 102). Hb. B. White, Nos. 6, 71, 75, 84, 187, 244, 247. E. F. & W. R. Linton, No. 8. Toepffer, Nos. 45, 95, 295–297.

A bush or small tree, commonly 8–12 ft., rarely in wet copses 20–30 ft.; twigs very pliant, and when cut back as an osier very long; densely pubescent while young, sooner or later glabrescent except near the tip; buds crowded above, pubescent, upper ones persistently. Stipules small lanceolate, soon deciduous; petioles very short with dilated bases. Leaf-blades 4–10 in. long, sublinear to lanceolate, broadest below the middle, attenuate upwards, cuneate at the base, with undulate margin subentire or obscurely crenate, revolute when young; green, glabrous or glabrescent above, grey-tomentose with fine closely adpressed shining hair beneath. Catkins fl. April before the leaves, dense-flowered, rather stout, subsessile, with a few small leaves at the base or 0; ♂ 1–1¾ in. long, ovoid-oblong, rachis very silky; stamens long, glabrous; ♀ about 1 in. long in fl., 1–2½ in. in fruit; bracts oblong-spathulate or obovate-subacute, pilose, rusty brown, blackening much above; ovaries ⅕–¼ in. long, usually broad-based ovoid-conic, subsessile, tomentose, grey or greyish-green with adpressed hair; nectaries linear, much exceeding the very short pedicels, often incurved; styles long, nearly equalling the long slender stigmas.

There is a curious form from the river-side base of Little Doward, Herefordshire, with cordate-lanceolate stipules ⅓–½ in. long, broad and dentate or denticulate in the lower half, abruptly contracted with attenuate point, which is a good example of the var. *stipularis* Leefe (*British Salices, Arrangement and Description of*, No. 12 γ, undated).

The var. *intricata* Leefe (*l. c.* No. 12 β) was defined as having broader leaves, shorter and broader ovaries, short styles, and stigmas divided reflexed and entangled. Such a plant has been distributed by the Rev. A. Ley from Wilton, Herefordshire (B. E. C. Rpt. 1887, 189), but is scarcely separable from the type as a distinct variety.

There is a var. *linearifolia* Wimmer u. Grab. (Fl. Siles. ii. (1829) 368) with narrow linear leaf-blades, probably the same as β *angustissima* Coss. et Germ. (Fl. env. Paris, ed. 2, 618), to which may be referred a plant found at Market Weston, Suffolk; the product, it may be, of the hard dry ground on which it grew.

Osier growers have in cultivation at least six varieties of *S. viminalis* which are distinguished by their good or indifferent qualities for commercial purposes—a smooth straight habit, toughness of peel and pliability of wood that bends without breaking being the qualities most valued; "Longskins" is reckoned best by one grower for its tough peel; "Brown Merrins" next best for its pliable wood; while "Yellow Osier," which excels in these points, is condemned because "side-sprigged," or running to branchlets, which spoils it for high-class work (on "Cultivation of Osiers," see a paper $\mathrm{A}\frac{3-93}{\mathrm{I}}$ published by the Board of Agriculture).

S. viminalis is of frequent occurrence, at a low level, throughout the British Isles, except in the North of Scotland; usually planted, by streams, in hedges on marshy ground, and in osier holts; perhaps indigenous in eastern and central England, at times self-sown (*e.g.*, in Herefordshire). Throughout Central and Northern Europe; also in Siberia.

S. viminalis × *aurita* (p. 30).
× *caprea* (p. 30).
× *cinerea* (p. 31).
× *purpurea* (p. 27).
× *repens* (p. 60).
× *triandra* (p. 13).

SALIX AURITA × VIMINALIS.

Syn. *S. ferruginea* G. Anderson, Syme E. B. viii. 228.—*S. aurita* × *viminalis* Wimmer in Regensb. Flora, 319 (1848); Sal. Eur. 183. Camus, Monogr. 320. Seemen, iv. 274.—*S. fruticosa* Döll. ii. 515.—× *S. Smithiana* Willd. *β velutina*, var. *ferruginea*, Anderss. DC. Prodr. xvi. (2) 267.—*S. Smithiana δ ferruginea* B. White, Revision, 414.

Icon. E. B. S. t. 2665. Forbes, Sal. Wob. t. 128.

Exs. Leefe, Sal. Brit. exs. No. 35, 36; Sal. exs. iii. 63. Wimmer, Sal. Relict. (Herb. Sal. 12, 135; Coll. Sal. 176–178). Hb. B. White, Nos. 128, 181. E. F. & W. R. Linton, No. 11. Toepffer, Nos. 44, 57, 258, 259.

A shrub 5–10 ft. high, branches slender, pubescent at first, soon glabrescent. Stipules ½-cordate-lanceolate, ± dentate on the outer edge, tip often twisted aside. Leaf-blades 2–5 in. long, rather narrowly lanceolate, undulate, crenate-serrate or often with some serrations above the middle, somewhat wrinkled, green and soon glabrate above, grey and shortly woolly-pubescent (or with adpressed hair), slowly glabrescent (at least in the lower leaves) beneath, tip often twisted. Catkins ¾–1¼ in. long, fl. April, slender, bracts oblong-spathulate to oblong-acuminate, clothed with silky hair; ♀ elongate in fruit up to 2 in. by ⅓ in. broad; ovaries conic tomentose, nectaries linear nearly as long as the pedicels, styles short or medium, about as long as the stigmas.

This hybrid, which differs from others of the group by its narrower leaf-blades with undulate margins and its more slender catkins, occurs in lowland situations, very sparsely from Perthshire southwards; Co. Kilkenny in Ireland. Europe: France, Germany, Scandinavia.

SALIX CAPREA × VIMINALIS.

Syn. *S. mollissima* Sm. Fl. Brit. iii. 1070.—*S. caprea-viminalis* Wimmer, Sal. Eur. 178.—*S. Smithiana* Willd. *α sericans* (Tausch.) Anderss. DC. Prodr. xvi. (2), 267. B. White, Revision, 217.—*S. caprea* × *viminalis* Camus, Monogr. 309. Seemen, iv. 268.

Icon. Forbes, Sal. Wob. t. 134. Camus, Atlas, pl. 29, A–F.

Exs. Hb. Linn. Nos. 48, 76a. Leefe, Sal. Brit. exs. Nos. 27, 28, 30, 31, 33, 34 (as *S. rugosa* Leefe); Sal. exs. Nos. 22, 86 ("*S. Smithiana* W., not E. B."), 101? Wimmer, Sal. Relict. (Herb. Sal. 74, 118; Coll. Sal. 160, 166, 168). Hb. B. White, Nos. 236, 237. E. F. & W. R. Linton, No. 12. Toepffer, No. 60.

A large shrub, 10–18 ft. high, with branches rather stout and gradually glabrescent, not striated under the peel; buds oval, pubescent at first becoming puberulous or glabrous. Stipules rather large, ½-cordate- to ½-ovate-acuminate, ± serrate or dentate on the outer edge. Leaf-blades large, 2–5 in. long by ¾–1½ in. broad, broadly lanceolate, sometimes shortly ovate-lanceolate (*S. rugosa* Leefe), with margins flat or scarcely undulate, subentire to crenulate, green soon glabrescent above, grey to grey-green densely and softly pubescent beneath, pubescence often subpersistent. Catkins about 1 in. long in flower, stout silky subsessile or shortly peduncled with few basal leaves or 0; ♂ appearing just before the leaves in April, ♀ with the leaves, elongating to 1½ or 2 in.; bracts of both oblong-lanceolate to obovate-acuminate, clothed with long silvery or dark grey silky hairs; ovaries large, tomentose; pedicels shorter at first, at length as long to twice as long as the oblong nectaries, styles and stigmas subequal of moderate length.

Several forms of this hybrid have been named, by Wimmer and others, as varieties, the breadth of the leaf and the quality of the pubescence chiefly furnishing characters for distinguishing them. It is, however, of more importance to separate the hybrids of *S. viminalis* with the three British species of the *Capreæ* than to split up these hybrids into varieties, which are at best indefinite forms shading into one another. Andersson seems to have thought this a hopeless task, and places the hybrids of *S. viminalis* with *S. aurita*, *S. caprea*, and *S. cinerea* under an aggregate × *S. Smithiana*, in three groups—*α sericans* Tausch., *β velutina* Schrad., and *γ acuminata* Smith, with × *S. stipularis* Sm. as an independent hybrid.

With regard to the name *S. Smithiana*, Andersson was right in his treatment of it as an aggregate. From the first, hybrids of *S. caprea* and *S. cinerea* with *S. viminalis* have been confused under this name; and while modern salicologists have usually set down *S. Smithiana* as a hybrid of *S. caprea*, it is evident that the figure in E. B. (t. 1509), with its pubescent flowering shoots, &c., is *S. cinerea* × *viminalis*; while Smith's description (Engl. Fl.), if not entirely this latter hybrid, blends in it some of those features which distinguish it from the former. Similar confusion is found commonly in British herbaria, in which the larger portion of specimens labelled *S. Smithiana* are *S. cinerea* × *viminalis*, a great many of the corresponding *S. caprea* hybrid being distinguished under Leefe's name *S. rugosa*.

S. caprea × *viminalis* has been found in several counties, from Cornwall, Dorset, and Kent northwards to Roxburgh and Arran, and doubtless occurs in many for which it has not yet been recorded; Co. Limerick, Queen's County, and Antrim, in Ireland. Europe: Holland and Belgium, Vosges Mountains (Hb. Magnier), Germany, Bohemia, Switzerland, Austria, Galicia.

SALIX CINEREA × VIMINALIS.

Syn. *S. Smithiana* Willd. (En. Hort. Berol. ii. 1008?). Koch, Syn. 746. Sm. Engl. Fl. iv. 229, pro parte. Syme, E. B. viii. 226. B. White, Revision, 418.—*S.* × *Smithiana β velutina* Anderss. DC. Prodr. xvi. (2) 268.—*S. cinerea-viminalis* Wimmer, Sal. Eur.

181.—*S. cinerea* × *viminalis* Camus, Monogr. 314. Seemen, iv. 266.

Icon. Forbes, Sal. Wob. tt. 128, 134. E. Bot. t. 1509. Camus, Atlas, pl. 29, M–R.

Exs. Leefe, Sal. Brit. exs. Nos. 25, 26; Sal. exs. iv. 89. Billot, No. 461. Magnier, No. 2062. Wimmer, Sal. Relict. (Herb. Sal. 23, 87; Coll. Sal. 170, 173 (excl. b), 174, 175). E. F. & W. R. Linton, No. 10. Toepffer, No. 124.

A shrub, 6–12 ft. high, much branched, branchlets rather thick torulose persistently pubescent, the wood under the peel marked with the short striations of *S. cinerea*; buds oval pubescent. Stipules rather narrowly ½-ovate-lanceolate subentire. Leaf-blades 2–4½ in. long lanceolate or oblanceolate plane, crenate or sometimes crenulate-serrate, dull green and pubescent above, ashen-grey or glaucous, with silky pubescence ± adpressed, sooner or later glabrescent, beneath. Catkins 1–1½ in. long in flower in April, appearing before the leaves, subsessile with few small leaves at the base; bracts obovate usually broad and rounded above, clothed with long silky hairs; ♂ catkins ovate to ovate-oblong; ♀ elongate to 2 in. or more, ovaries conic grey-green pubescent; pedicels at length about as long as the nectaries; styles moderate, as long or nearly as long as the stigmas.

This hybrid is most easily confused with *S. caprea* × *viminalis*. It may be distinguished by the rather less stout and persistently pubescent twigs, the leaf-blades rather narrower and with the under side less softly woolly-pubescent and more glabrescent; narrower and more entire stipules; catkins not so stout; and by the presence of striæ on the 1–2 year-old wood under the peel.

If the name *S. Smithiana* Willd. were restricted to one definite hybrid, it is perhaps this which should bear the name. Wimmer, after first applying it to *S. caprea* × *viminalis* (Sal. Eur. 178), has added in his account of *S. cinerea* × *viminalis* the remark, "Nomen '*S. Smithiana* Willd.' huc potissimum ducendum esse videtur" (*l. c.* p. 182). But there is much to justify Andersson in regarding it as an aggregate name including all three of the allied hybrids between *S. viminalis* and the *Capreæ*.

A reference to Smith's herbarium shows that *S. aurita* × *viminalis* is also concerned. There are two sheets labelled *S. Smithiana*; one of these, from a Continental locality, is *S. aurita* × *viminalis*! the other, from "nr. Pennard Castle, Glamorgan," is either the same hybrid, or else *S. cinerea* × *viminalis*. Thus the combined evidence of Smith's plate and description and specimens shows that *S. Smithiana*, according to him, included the hybrids of *S. viminalis* with *S. caprea*, *S. cinerea*, and *S. aurita*.

Trustworthy records of this lowland willow are no doubt deficient. It is known to occur in several counties from Dorset and Kent, and from Glamorgan in the west, to W. Derbyshire and S. Lancashire; in Perthshire and Clackmannan; in Kerry and Leitrim, in Ireland. Europe: France, Germany, Denmark, Scandinavia, Switzerland, Austria, Russia; Turkestan, Siberia.

× Salix stipularis Sm. Fl. Brit. iii. 1069; Engl. Fl. iv. 230; in Rees Cycl. 136. Wade, 376. Wimmer, Sal. Eur. 184. Syme, E. B. viii. 225.—× *stipularis* Anderss. DC. Prodr. xvi. (2), 266. B. White, Revision, 415. Camus, Monogr. 318.

Icon. E. Bot. t. 1214. Forbes, Sal. Wob. t. 132.

Exs. Hb. Smith (*S. stipularis*, osier-ground near Bury). Leefe, Sal. exs. i. 15. Wimmer, Sal. Relict. (Herb. Sal. 120; Coll. Sal. 169). Hb. B. White, No. 475, for the ♂ plant, and unnumbered specimens of the ♀. E. F. & W. R. Linton, No. 9 (1), No. 84.

A bush with the habit of *S. viminalis* L., but shorter, with broader leaf-blades and foliaceous stipules. Branches and buds softly woolly-pubescent, becoming reddish-brown by winter. Stipules up to 1 in. in length, longer than the petioles, foliaceous subpetiolate, ½-cordate attenuate to a fine point, serrulate or subdentate, glabrescent above, softly woolly-pubescent beneath, not fully developed till August. Leaf-blades 5–7 in. long, narrow lanceolate attenuate, slightly undulate, obscurely crenate-serrate or crenate or subentire, with revolute margins when young, dull green and gradually glabrescent above, whitish-grey with satiny pubescence beneath. Catkins appearing in May before the leaves, erect, subsessile with a few small leaves at the base; bracts ovate-oblong clothed with dense long silky hairs; ♂ nectaries very long; filaments free, glabrous; ♀ catkins 1–1½ in. long; ovaries ovoid tomentose subsessile; nectaries long linear; style moderate, stigmas as long or longer, linear undivided.

Almost indistinguishable from a broad-leaved form of *S. viminalis* till the stipules are developed in late summer; then easily recognized.

Wimmer suggested *S. dasyclados* × *viminalis* as the origin of × *S. stipularis*; others have thought that *S. cinerea* is the other factor, *S. viminalis* obviously being one parent. This latter view is most likely, being corroborated by the observations of MM. Camus that the striations on the wood beneath the bark that are characteristic of *S. cinerea* are found in × *S. stipularis*; and that its internal morphology does not differ sensibly from that of *S. holosericea* Willd. (a more intermediate and commonly recognized form of *S. cinerea* × *viminalis*).

Its distribution is not well ascertained. Syme (*l. c.*) calls it rare, recording it from Essex and Suffolk. It is known, however, for Dumfriesshire, Colonsay, and near Helmsdale, Sutherlandshire, and there are several stations in Perthshire. Europe: Germany, Denmark, Transylvania, S. Russia.

× Salix acuminata Sm. Engl. Fl. 10, 227; in Rees Cycl. 129. Syme, E. B. viii. 229. Anderss. DC. Prodr. xvi. (2), 268. B. White, Revision, 420.—*S. Calodendron* Wimmer, Sal. Eur. 187.—*S. dasyclados* Wimmer in Flora, xxxii. 35 (1849). Seemen, iv. 177.—*S. caprea acuto longoque folio* Raii Syn. ed. 2, 292.

Icon. E. Bot. t. 1434. Forbes, Sal. Wob. 131. Fl. Dan. 2669.

Exs. Leefe, Sal. Brit. exs. No. 37; Sal. exs. ii. 27. Wimmer, Sal. Relict. (Herb. Sal. 121; Coll. Sal. 100). Baenitz, Herb. Europ.

(*S. longifolia* Host from Breslau). E. F. & W. R. Linton, No. 13. Toepffer, Nos. 65, 65*a*.

A tall shrub or small tree, 10–18 ft. high, with densely woolly-pubescent branches, the pubescence unusually long, subpersistent on later summer shoots to the next spring and turning black; buds with similar pubescence subpersistent through the winter. Stipules large ½-cordate-acuminate often attenuate to a fine point, ± denticulate, erect. Leaves large, blades 4–5 in. long by ¾–1½ in. broad, oblong- to obovate-lanceolate with acute tip, commonly broadest about the middle; crenate to crenate-serrate, dull green and somewhat pubescent above, glaucous-green to glaucous or ashen, rather softly pubescent beneath, densely at first more thinly later. Catkins appearing with the leaves in late March and April, stout subsessile with few small basal leaves; ♂ unknown; ♀ 1¼–3 in. long by ½ in. broad; bracts oblong-obovate bluntly pointed, silkily villous, the upper half blackish-brown; ovaries stoutly ovoid-conic, white-tomentose, elongating to ¼ in. long; nectaries linear-oblong, about equalling the tomentose pedicels; styles about the same length as the thick undivided stigmas.

Wimmer, thinking the name *S. acuminata* was not free from ambiguity, renamed this plant *S. caprea-dasyclados* (Denkschr. d. Schles. Ges. p. 163); then doubting the suggested parentage, he called it *S. Calodendron* (Sal. Eur. 187). Andersson quotes *S. Calodendron* as a synonym of *S. acuminata* Sm., having identified the two when discussing with Leefe the latter's Sal. Brit. exs. No. 37, which Leefe had issued with Borrer's sanction as *S. acuminata* Sm. Dr. F. B. White, on comparing Leefe's specimens of this with Wimmer's *S. dasyclados* (Coll. Sal. No. 100), found them practically identical.

The handsome catkins with their large dark bracts displayed against the white background of the ovaries recall the Perthshire form recorded and preserved (Hb. B. White, unnumbered) under the name *S. tephrocarpa* Wimmer; and there is good evidence in this (as in that) of a blend of both *S. caprea* and *S. cinerea* in its composition.

S. acuminata Sm. is distinguishable from *S. caprea* × *viminalis* by its large handsome catkins with their long dense silky clothing, its upper flowering twigs thickly black-pubescent, and in summer by the persistent pubescence on twigs and buds, a shade of ash colour under the leaves and some serration in their margins above the middle in well-developed specimens. Smith observed the resemblance between these two, having entered the remark, on a sheet of *S. acuminata*, "We have two vars., one a larger more freely growing tree than the other, with much larger and less crumpled leaves, but we could never ascertain a correct specific difference between them"; and on an adjoining sheet are specimens of *S. acuminata* and the f. *rugosa* of *S. caprea* × *viminalis*. On another sheet of *S. acuminata*, Smith has written, "Mr. Crowe's garden No. 2 (*S. buddleifolia*)."

Native in lowland situations in Great Britain, where it is supposed to have had its origin, it must usually have been planted, since only one sex is known. It occurs in a few Midland counties from Norfolk and Suffolk to Staffordshire; also in Dumbartonshire, and formerly in co. Edinburgh. Owing to confusion with allied hybrids, other records are doubtful. On the Continent its occurrence is doubtful outside botanic gardens.

7. Salix lapponum L. Sp. Pl. 1019. Anderss. Sal. Lapp. 22, and in DC. Prodr. xvi. (2), 276. Wimmer, Sal. Eur. 38. Syme, E. B. viii. p. 252. B. White, Revision, 426. Hartman, 365. Camus, Monogr. 147. Seemen, iv. 182.—*S. arenaria* L. Sp. Pl. 1019, *cf.* Sm. Fl. Brit. 1058; Engl. Fl. iv. 204.—*S. limosa* Wahl. Fl. Lapp. 265 (1812).—*S. Stuartiana* Sm. Engl. Fl. iv. 203.

Icon. E. Bot. tt. 1809, 2586. Forbes, Sal. Wob. tt. 70, 72, 73. Fl. Dan. 1058. Camus, Atlas, pl. 12, A–E.

Exs. Hb. Smith (*S. lapponum*, *S. arenaria*, *S. Stuartiana*). Fries, vii. 58. Wimmer, Sal. Relict. (Coll. Sal. 91, 93 *b*, *c*, 95). E. F. & W. R. Linton, Nos. 45, 53. Hb. B. White, Nos. 296–298, 301–303, 391. Toepffer, No. 71.

A small compact shrub, 1–5 ft. high, branching from the base, branches ascending pubescent at first, glabrous by winter, dark brown shining; buds ovoid obtuse woolly-pubescent dark brown, flower-buds large, often yellowish-brown in winter, with subpersistent pubescence. Stipules 0, or minute, fugitive. Leaf-blades 1–2¼ in. long, broadly oblong or obovate-oblong, rarely narrow-elliptic or lanceolate, acute or acuminate (lower often obtuse), entire sometimes undulate, cuneate to rounded at the base, seldom subcordate, softly pubescent and grey-green to dark-green above with veins impressed, white- to grey-tomentose beneath, veins visible. Catkins appearing before the leaves, June, July, subsessile with few very small peduncular leaves; bracts oblong or obovate-oblong obtuse or more commonly subacute, villous with long silky hair; ♂ catkins oval, 1 in. long, filaments glabrous, anthers yellow or reddish at first; ♀ 1–2 in. long, rather close-flowered, rachis woolly; ovaries $\frac{1}{5}$–$\frac{3}{10}$ in. long, white with pubescence then grey-green, ovoid-conic, subsessile (lower ones becoming shortly pedicelled); nectaries linear, long, nearly reaching the broadest part of the ovaries; stigmas long, usually divided, hardly as long as the long styles.

S. lapponum varies in the breadth and length of the leaf-blades and in their clothing, but the various forms pass gradually into one another. Smith describes a greener form with leaves less clothed as *S. arenaria*, adopting a name which Linnæus had given to a mixture of *S. lapponum* and *S. repens argentea* forms; and a form with more woolly leaves as *S. Stuartiana*. The latter may be the same as Wimmer's b. *marrubiifolia* (Sal. Eur. p. 41).

A more distinct variety is that which Smith described as *S. glauca* (*S. lapponum* var. *pseudo-glauca* Syme), and which Dr. B. White (Revision, p. 428) has well argued is the same as *S. helvetica* Vill. (Hist. Plant. Dauph. p. 783). If the specimen in the Edinburgh Univ. Herb. labelled "*Salix glauca*, Ben Lawers" by Winch—which is *S. glauca* Sm., i. e. *S. helvetica* Vill.—really came from Ben Lawers, this variety, or subspecies, of

S. lapponum, may be claimed as British. But in the absence of any other Scottish specimens of this plant, there is reason to suspect the accuracy of the label.

S. lapponum ranges from 1000 to 3000 ft. in the Scotch mountains (700 ft. in the Ochill Hills, B. White, Revision, p. 427), and is chiefly found from Argyllshire and Forfar northwards to Sutherlandshire. It also occurs in Stirlingshire, co. Edinburgh (planted ?), Dumfriesshire, and Westmorland. Mountains of North and Central Europe; Siberia.

S. lapponum × *arbuscula*.
× *aurita* (p. 43).
× *caprea* (p. 50).
× *herbacea*.
× *lanata*.
× *myrsinites* (p. 36).
× *phylicifolia* (p. 37).
× *repens* (p. 37).
× *reticulata* (p. 38).

SALIX LAPPONUM × MYRSINITES.

Syn. *S. lapponum-myrsinites* (*S. phæophylla* Anderss. in Bot. Not. 116 (1867), *fide* Seemen, iv. 287; but all the original specimens of *S. phæophylla* Anderss. are *S. herbacea* × *lapponum*, according to what S. J. Enander told me in 1909).—*S. Lapponum* × *Myrsinites* Linton in Journ. Bot. 1892, 363.

Exs. Hb. E. F. Linton (garden), Nos. 175, 176, 177, 182.

A dwarf decumbent shrub with pubescent young branches, at length glabrous polished dark brown; buds dark brown glabrescent. Stipules not seen. Leaf-blades usually ovate-oblong, sometimes obovate-oblong, obscurely serrate or subentire, dark green glabrescent and ± shining above, grey-pubescent beneath with subpersistent pubescence. Catkins ½–1 in. long, appearing before the leaves or ♀ with the leaves; ♂ ovoid to ovoid-oblong, subsessile, with few small leaves or 0 below, very silky, anthers red-tipped; ♀ on short peduncles leafy below, bracts obovate-oblong, obtuse or broadly obovate rounded above, silkily pubescent; ovaries grey-pubescent, at length ovoid-conic, sessile or lower subsessile; nectaries linear-oblong entire or notched and slightly expanded at the tip, exceeding the base of the ovaries; style and stigmas long, often tinged with red.

This hybrid has been admitted into the list on the strength of specimens gathered in part of Glen Fiagh, Forfarshire, by W. R. Linton and myself, and believed by us to be of this origin, being of bolder growth and having larger foliage than *S. herbacea* × *lapponum* in this or other localities. These are, however, referred together with Andersson's original specimens of *S. phæophylla* to *S. herbacea* × *lapponum* by S. J. Enander.

On this account the above description is made, not from the Glen Fiagh plant, but from a series of plants, ♂ and ♀, raised and grown in the garden at Bournemouth from seed of *S. lapponum* fertilized by *S. myrsinites*, where no *S. herbacea* at the time existed.

SALIX LAPPONUM × PHYLICIFOLIA Gillot in Revue de Bot. (1890) 517. Linton in Journ. Bot. (1892) 362. Enander, iii. Nos. 149, 150, pp. 81, 82 (1910).—*S. Gilloti* Camus, Monogr. 365.—*S. phylicifolia* × *lapponum* Seemen, iv. 285.

Icon. Camus, Atlas Pl. 33, B, C. Enander, fasc. iii. Nos. 149, 150 (icon. photogr.).

Exs. E. F. & W. R. Linton, Nos. 53, 86 (see note below).

A small shrub, 1–4 ft. high, branches pubescent or tomentose when quite young, soon glabrous, at length dark brown, ± shining. Stipules not apparent. Leaf-blades 1–2½ in. long (1) oval acute or (2) oblong-lanceolate, sometimes slightly obovate, serrate in the case of some of the leaves, or more usually entire or subentire, pubescent at first (1) softly, or (2) slightly, soon glabrescent on the upper only or on both surfaces. Catkins 1 in. long or more, ♀ elongate, 2–2½ in. in fruit, greyish-green, with few small basal leaves or 0; bracts obovate obtuse (lower pointed), clothed with long silky hair; ovaries pubescent; pedicels rather longer than the oblong nectaries; styles and stigmas long.

The description of this rare hybrid is made from (1) a more pubescent form in which *S. lapponum* is the obvious partner (No. 152 hort. = British Willows, No. 53), found on rocks 2 m. N. of Ben Lawers, Perthshire; and (2) a more glabrous plant only somewhat pubescent at the very first, produced in the garden (No. 171, hort. meo). This latter is very similar to a plant from Glen Doll, Forfarshire (No. 88, hort. meo = British Willows, No. 86, issued as *S. lapponum* × *phylicifolia*), which, however, appears to have traces of *S. Andersoniana* in its leaves and stipules, as well as *S. phylicifolia*. Europe: France (Puy de Dôme); Sweden.

SALIX LAPPONUM × REPENS.

Syn. *S. lapponum-repens* Wimmer, Sal. Eur. 241. — *S. repens* × *lapponum* Seemen, iv. 279.

Exs. Magnier, No. 2842. Hb. C. Bailey (Fl. suecica, Piteå, Dr. C. Häkansson). E. F. & W. R. Linton, No. 87. Hb. E. S. Marshall, No. 2963.

A dwarf shrub, 1–1½ ft. high, with slender branches silkily pubescent at first, ± glabrescent in the winter, darkish brown, now and then shining; buds shortly oval, pubescent, at length only puberulous. Stipules small lanceolate, rarely seen. Leaf-blades ¾–1½ in. long, lanceolate to oval-oblong, mostly acute, subentire or with minute rather distant teeth, margin somewhat reflexed; dull green and thinly pubescent above, with some depressed nerves, grey with adpressed or loose silky pubescence beneath. Catkins appearing before the leaves in April or May, subsessile or shortly peduncled, with a few small basal leaves; ♀ oblong, elongate to 1½ or 2 in., bracts rather broadly obovate, rounded or truncate-rounded above, villous towards the top, ovaries conic, white-tomentose then grey-green; pedicels unequal, many elongate, 1–3 times the length of the linear-oblong nectaries; styles moderately long, stigmas rather shorter than the styles.

This description is mainly taken from the intermediate plant raised by me in the garden (see British Willows, No. 87). Some four plants of this have been found (1894–1906) in the valley through which the Lochy Burn runs, near the Spital of Glenshee, Perthshire. Europe: East Prussia; Sweden.

SALIX LAPPONUM × RETICULATA.

Syn. S. *sibyllina* B. White?, Revision, 446 (leaves only); quoted by Seemen, iv. 329.

Exs. Hb. Edin. Bot. Gard. (from Loch Brandy, Clova, Greville, 1824)?. Hb. E. F. Linton, No. 344 (*S. Boydii* ined.). The latter plant is here described:—

SALIX BOYDII, nov. hybr. Dwarf erect shrub, rigid, branches thinly pubescent at first; buds globose, light olive, then dark brown, soon glabrous. Stipules none seen. Leaf-blades small up to $\frac{3}{4}$ in. long, rotund, usually cordate or subcordate, or rounded, entire, rounded above or retuse, shortly petioled, dark green above slowly glabrescent, rugose with veins deeply impressed, grey beneath with dense persistent pubescence, veins much raised, reticulate, thick, coriaceous, margin revolute. Catkins $\frac{1}{2}$–$\frac{3}{4}$ in. long, appearing with or rather before the leaves, ovoid at first; bracts obovate, rounded and blackened above, clothed with long silky hair; ovaries shortly ovoid in the young state, tomentose, sessile; nectaries solitary, linear, long; style and stigmas fairly long.

This unique plant is very near *S. reticulata* in the leaf-blades and very near *S. lapponum* in its inflorescence, and it might be assumed that × *S. Boydii* drew its origin from these two parents only; but there are two characters, the short petioles and the short nearly round glabrescent buds, which neither of these satisfactorily account for. These two characters suggest that a third species, viz. *S. herbacea*, may have entered into its composition, more or less remotely.

S. sibyllina, described by Dr. B. White from leaf specimens only, and thought by him to be *S. lapponum* × *reticulata*, matches a plant from Glen Fiagh, Forfarshire (hb. E. F. Linton, No. 50), which is almost certainly one of the numerous forms of *S. herbacea* × *lapponum*.

The new hybrid form, of which a description in Latin follows, was found by Mr. Wm. Boyd in Glen Fiagh, and has been cultivated for some years at Faldonside.

× SALIX BOYDII, nov. hybr. Frutex nana ramulis rigidis novellis pubescentibus; laminis $\frac{1}{2}$–$\frac{3}{4}$ unc. longis subrotundis ad basin cordatis vel rotundatis integris, mox glabrescentibus rugosis venis supra impressis, infra griseo-pubescentibus venis elevatis reticulatis, marginibus revolutis. Iulis $\frac{1}{2}$–$\frac{3}{4}$ unc. longis, ♀ bracteis obovatis supra rotundatis nigrescentibus, pilis longis sericeis vestitis; ovariis ovatis sessilibus tomentosis; nectariis singulis linearibus; stylis et stigmatibus sat longis.

Named after Mr. W. Boyd, who discovered it.

vii. Capreæ.

Capreæ (Koch p.p.) Anderss. DC. Prodr. xvi. (2), 215. Shrubs or small trees; branches short, turning dull grey-brown. Leaves pubescent; vernation equitant. Catkins lateral, usually sessile, with a few small basal leaves; rachis woolly tomentose; stamens 2 free, anthers yellow; bracts persistent, tip becoming discoloured; ovaries pubescent, silvery, then green; styles 0 or short, stigmas short, commonly subsessile.

Branches and catkins slender .... 8. *S. aurita* L.
Branches and catkins rather stout 2
2 { Young branches glabrescent, leaf-blades crenate or subentire, very softly pubescent, persistently so beneath .... 9. *S. caprea* L.
Young branches persistently pubescent, leaf-blades serrate above the middle or crenate, pubescent, usually becoming harsh beneath 10. *S. cinerea* L.

8. Salix aurita, L. Sp. Pl. 1019. Sm. Fl. Brit. 1064; in Rees Cycl. 117; Engl. Fl. 4, 216. Wade, 326. Anderss. Monogr. i. 69. Doell, 497. Wimmer, Sal. Eur. 51. Anderss. DC. Prodr. xvi. (2), 220. Syme, E. B. viii. 232. B. White, Revision, 382. Camus, Monogr. 171. Seemen, iv. 111.—*S. caprea* δ *aurita* Hudson, Fl. Angl. 430.—*S. folio rotundo minore* Dill. in Raii Syn. 450.

Icon. Hoffm. Hist. Sal. t. 4, t. 5, fig. 3; t. 22, fig. 1, a–d. Forbes, t. 124. E. B. t. 1487. Fl. Dan. 2600. Anderss. Monogr. f. 43. Syme, E. B. t. 1330.

Exs. Hb. Linn. Nos. 68*b*, 70? Billot, Nos. 848, 948. Wimmer, Sal. Relict. (Herb. Sal. 99, 143; Coll. Sal. 34, 36). Leefe, Sal. Brit. exs. No. 45; Sal. exs. No. 65. E. F. & W. R. Linton, Nos. 15, 89. Toepffer, Nos. 7, 8 (f. *bicapsularis*), 46, 108 (f. *minor* Anderss.), 110.

A much branched shrub, 2–8 ft. high, with slender, spreading branchlets, pubescent at first, soon glabrous, at length reddish-brown; wood striated beneath the bark; buds shortly oval, soon glabrescent. Stipules often substipitate, reniform, deeply and often irregularly dentate, large, rarely absent. Leaf-blades $\frac{1}{2}$–2 in. long, broadly obovate to oblong-obovate, with a short acute ± twisted tip, ± narrowed to the base, often cuneate; undulate, coarsely serrate or serrate-dentate, rugose (veins impressed above, prominent beneath), dull green or grey, with dense pubescence at first, somewhat glaucous and pubescent beneath (hairs often rusty), margin narrowly reflexed. Catkins $\frac{1}{4}$–$\frac{3}{4}$ in. long in flower, subsessile, with some few small leaves at the base, appearing in April before the leaves; ♂ ovoid; stamens nearly glabrous in the lower part; ♀ narrowly cylindric, slightly elongate and lax; bracts narrowly oblong obtuse, thinly hairy, pale at first and somewhat ferruginous below the blackening tip; ovaries small, subulate-conic, silvery white, becoming pale green; pedicels elongate, at length 3–4 times as long as the very short nectaries; stigmas small, usually sessile or very nearly so.

Var. *minor* (Anderss. Monogr. p. 70?), Syme, *l. c.* p. 233, is a plant with small roundish-obovate leaves, $\frac{1}{2}$–1 in. long, and is perhaps rather a state induced by unfavourable conditions than a distinct variety. Andersson's plant may be (or at least include) a small form of the hybrid *S. ambigua*, as he himself suspected.

A variable species within well-defined limits in the British Isles, and not easily confused with *S. cinerea*. On the Continent wider variation occurs, some forms being marked by larger and sometimes smoother leaves. For instance, of three sheets of *S. aurita* in the Herb. Europ. of Dr. C. Baenitz (not numbered), that of (1) "Fl. Marchica, leg. Riese," alone is one of our forms; (2) the plant of "Fl. Silesiaca, leg. C. Baenitz," has rather larger, smoother leaves; and in (3) "Badenia, leg. Dr. Schatz," the leaf-blades run to 2½ in. long, are smooth and much like those of typical *S. cinerea* in size and shape, though the plant is apparently pure *S. aurita*.

Ascending from sea-level to 2200 ft. in the Highlands, *S. aurita* is recorded from all but a very small number of counties, and probably occurs in all. Like *S. caprea*, it is usually found in drier situations than *S. cinerea*. It is distributed through Central and Northern Europe, from France and Scandinavia eastwards; Caucasus, N. Persia.

Salix aurita × *caprea* (p. 40).
× *cinerea* (p. 41).
× *cinerea* × *Andersoniana* (p. 42).
× *cinerea* × *phylicifolia* (p. 42).
× *herbacea* (p. 42).
× *lapponum* (p. 43).
× *myrsinites* (p. 43).
× *myrsinites* × *Andersoniana* (p. 44).
× *Andersoniana* (p. 45).
× *Andersoniana* × *phylicifolia* (p. 45).
× *phylicifolia* (p. 45).
× *purpurea* (p. 23).
× *purpurea* × *phylicifolia* (p. 24).
× *repens* (p. 46).
× *viminalis* (p. 30).

SALIX AURITA × CAPREA.

Syn. *S. caprea-aurita* Wimmer, Denkschr. Schles. Gesellsch. (1853), 163; Sal. Eur. 200.—*S. capreola* Kerner in Anderss. Monogr. 79; DC. Prodr. xvi. (2), 223. B. White, Revision, 387.—*S. caprea* × *aurita* Seemen, iv. 219.—*S. aurita* × *caprea* Gürke, Pl. Eur. ii. 10. Camus, Monog. 346.

Icon. Camus, Atlas, pl. 31, H–L.

Exs. Hb. Borrer ("*S. caprea ?* Wood near Brodie House," and "*S. caprea*, New Hall, Mead Style, 3/26. 1815"). Wimmer, Sal. Relict. (Herb. Sal. No. 56; Coll. Sal. Nos. 25, 188, and *b*). Hb. Boswell (with *S. caprea*, four pieces of foliage and fruiting catkins out of six, "N. Surrey, H. C. Watson, 1865"). Hb. B. White, Nos. 344, 356, 410. E. F. & W. R. Linton, No. 90. Hb. E. S. Marshall, No. 126.

This hybrid has great resemblance to forms of *S. caprea*, with some of its parts of smaller size. It differs from *S. caprea* usually in having more slender twigs and smaller, shorter buds; leaf-blades smaller and more distinctly serrate in the upper half, tip twisted; stipules broader, short, and more cut; catkins and ovaries of smaller size, bracts more oblong and obtuse, and rather ferruginous below the discoloured tip; or at least in some of these characters.

It diverges from *S. aurita* in having rather stouter twigs and longer buds, larger leaves with more persistent soft clothing, a less serrate or rather crenate-serrate margin, the upper surface smoother; stipules less reniform, more acuminate; catkins and ovaries rather stouter and larger, the bracts (or some of them) more pointed.

S. aurita × *caprea* is a scarce and local hybrid; the two species do not commonly occupy the same sort of locality. It has been recognized from Dorset, Somerset, Kent, Surrey, Norfolk, Herefordshire, Worcestershire, Staffordshire, and Derbyshire, in England; from Mid-Perth, in Scotland; and Westmeath, in Ireland. Europe: France, Belgium, Scandinavia, Germany, Switzerland, Austria, Moravia, Galicia.

SALIX AURITA × CINEREA.

Syn. *S. cinerea-aurita* Wimmer, Flora, xxxi. 329 (1848). Seemen, iv. 216.—*S. multinervis* Doell, 516.—*S. lutescens* Kerner, Nied. Oesterreich. Weid. 253 (1859). B. White, Revision, 383.—*S. aurita-cinerea* Wimmer, Sal. Eur. 202.—*S. aurita* × *cinerea* Camus, Monogr. 324.

Icon. Camus, Atlas, pl. 30, S–Y.

Exs. Leefe, Sal. Brit. exs. Nos. 38, 41, 42; Sal. exs. iii. 77. Wimmer, Sal. Relict. (Coll. Sal. Nos. 27 (*S. cinerea*), 173 b (*S. cinerea* × *viminalis*)), 181. Hb. Beeby, No. 78. Hb. B. White, No. 433 (*S. caprea* × *cinerea*), and several sheets labelled *S. lutescens*. E. F. & W. R. Linton, Nos. 16, 17.

A very frequent and variable hybrid, flowering in April, best determined by recognizing the tokens of the two parents. It shows the influence of *S. aurita* in one or more of the following features: twigs more slender and glabrous than in *S. cinerea*; buds more curtly oval and glabrescent; stipules broader and more dentate; leaf-blades of a thicker texture, often subrugose and smaller; catkins smaller and slenderer, bracts narrower, more ferruginous, blackening less; ovaries smaller, whiter.

The traces of *S. cinerea* may be found in the stouter, more torulose twigs, which are more persistently pubescent than in *S. aurita*; buds more pubescent, longer; stipules more rounded; leaf-blades larger, harsher to the touch; catkins larger in all their parts; bracts more broadly obovate, with more blackened tips.

While the hybrids vary in all these characters, and consequently are far from being all much alike, plants and specimens of it commonly have more of a look of *S. cinerea* than of the other parent, and are sometimes difficult to distinguish with certainty from *S. cinerea* forms.

B. White (Revision, pp. 384, 385), after pointing out that many specimens named var. *oleifolia* prove to be *S. aurita* × *cinerea* (as Wimmer had previously observed, *l. c.* p. 202), goes on to remark that in several places in Perthshire, where both *S. aurita* and *S. cinerea* grew together, he had met with many intermediate forms, some of which, differing slightly from *S. cinerea*, he suspected to be "hybrids of *S. cinerea* with × *S. lutescens*."

S. aurita × *cinerea* has been recorded in many counties from Cornwall and Kent to Lancashire and Yorkshire; in Scotland, from Dumfriesshire, Roxburghshire, Selkirkshire, Stirlingshire, Dumbartonshire, Perthshire, Forfarshire, Kincardine, and Caithness; in Ireland, Limerick, Down, Antrim. Europe: France, Belgium, Switzerland, Germany, Austria, Bohemia, Galicia, Russia, Scandinavia.

SALIX AURITA × CINEREA × ANDERSONIANA.

Exs. Leefe, Sal. exs. iv. 87 ("*S. Waldsteiniana* Forbes, not of Willdenow, Koch, 658, received from Woburn, &c."). Hb. J. Fingland, No. 253 ♂. Hb. B. White, Nos. 245? 415, 442 (all as *S. strepida*).

Leefe's specimens show signs of all three species; *S. Andersoniana* contributing an elongate style and discoloration of the leaves, which in form and texture are much like those of *S. lutescens*; the stipules, as well as the leaf-blades, showing the presence of *S. aurita*.

Fingland's No. 253 is similarly like an intermediate form of *S. lutescens*, with a leaf-discoloration in evidence of *S. Andersoniana*.

No. 253 was found near Thornhill, Dumfriesshire; B. White's specimens are from the neighbourhood of Perth, and resemble forms of *S. lutescens* Kerner, with evidence of *S. Andersoniana* clearly marked.

SALIX AURITA × CINEREA × PHYLICIFOLIA.

Exs. Hb. B. White, Nos. 188 (as *S. Wardiana*), 420? Hb. J. Fingland, Nos. 295, 330.

Shrubs resembling a small-leaved form of *S. lutescens* Kerner, but with the earliest leaves glabrous and later ones ± glabrescent, and the bark of the one-year-old branches partially or decidedly showing a polished dark brown surface. Stipules ½-cordate-acute suberect or twisted aside; leaf-blades obovate-cuneate to oval-oblong, serrate more than crenate-serrate, acute to shortly acuminate, tip often twisted, later softly pubescent; ovaries slender, silvery; bracts narrow oblong to obovate-oblong silkily pubescent; pedicels about three times as long as the quadrate nectaries; styles long or medium long with small stigmas.

Near Thornhill, Dumfriesshire, Nos. 295 and 330, two bushes much resembling one another, but not identical. Also from Woody Island, in R. Tay, near Perth.

SALIX AURITA × HERBACEA.

Syn. *S. Margarita* B. White, Revision, 441.—*S. herbacea* × *aurita* Richter-Gürke, Plant. Europ. ii. 37. Seemen, iv. 323.

Exs. Hb. B. White, Nos. 368, 369. E. F. & W. R. Linton, No. 91.

Branches slender, procumbent or ascending, bark dark brown, rather shining; fresh twigs and buds pubescent, becoming glabrous. Stipules present on strong shoots, ½-cordate to roundish-reniform, serrulate. Leaf-blades ½–1¼ in. (3–4 times as long as the stalk), roundish, rounded or subcordate at the base, rounded above or with short twisted acute tip, serrate, pale dull green below, soon glabrescent. Catkins ¼–¾ in. long, on short pubescent leafy peduncles, fl. May; bracts narrow oblong obtuse, subglabrous, ciliate, pale, tipped with light red; ovaries ovate-conic white-pubescent; nectaries oblong, sometimes bipartite, pedicels about three times as long; stigmas bifid, about as long as the short thick style.

The ♂ plant has not been found.

The only localities known for this hybrid are on Ben Challum, and near the Lochy Burn, Glen Shee, Perthshire.

SALIX AURITA × LAPPONUM.

Syn. *S. aurita-lapponum* Wimmer, Denkschr. Schles. Gesellsch. 166 (1853); Sal. Eur. 194.—*S. aurita-limosa* Laestad. in litt. & hb. —*S. canescens* Fries, Mant. i. 58 pr. pte.—*S. Laestadiana* Htn. pr. pte., *β opaca*, 2° *subaurita* Anderss. DC. Prodr. xvi. (2), 278.— *S. aurita* × *lapponum* B. White, Revision, 429. Seemen, iv. 276.

Exs. Wimmer, Sal. Relict. (Herb. Sal. 98; Coll. Sal. 220). E. F. & W. R. Linton, No. 37.

Dwarf bush, 2–3 ft. high (in cultivation), much branched, branches ascending, pubescent, soon glabrescent, bark dark brown ± shining, buds woolly-pubescent at first, at length glabrous. Stipules much suppressed, ½-cordate-acuminate when well developed. Leaf-blades 1–2 in. long, obovate- or oval-acuminate, or oblong-lanceolate, narrowed to the base or to both ends, more rarely oval subobtuse, broad or narrow, tip usually acute, often twisted; grey or grey-green, softly pilose or woolly-pilose, sooner or later glabrescent; subentire but commonly obscurely serrate or crenate-serrate, often undulate at the margin. Catkins flowering in April usually rather before the leaves, with dark-brown shining bud-scales; ♂ 1 in. long, oval-oblong; ♀ 1–1½ in. long, silvery-grey to grey-green; bracts oblong or obovate-oblong subacute or obtuse, clothed with long silky hairs; pedicels at length longer than the linear-oblong nectaries; styles long, stigmas short or medium.

The leaves of this hybrid are generally more like those of *S. lapponum* than of *S. aurita*, only rather greener and more obovate; in one form, however, from Glen Shee, the leaves are more like *S. aurita*, and much greener than the average of intermediate specimens.

In Scotland it is known from Edinburgh, Perthshire (Mid and East), Forfarshire, and East Inverness. Europe: East Prussia, Scandinavia, Finland, Russia.

SALIX AURITA × MYRSINITES. E. F. & W. R. Linton in Journ. Bot. 1892, 361. [Exclude *S. saxetana* B. White, Revision, 434; see below.]

Exs. E. F. & W. R. Linton, No. 18. Hb. E. F. Linton, No. 39. Hb. W. R. Linton, Nos. 87, 96.

A dwarf shrub, rising in cultivation to 3 or 4 ft., much branched, twigs pubescent only at first; buds pubescent, rounded above; older wood dark-brown shining in parts. Stipules minute, roundish, not plentiful. Leaf-blades ½–1½ in. (–2 in. cult.) in length, oval-oblong to oval-obovate subacute (the earliest roundish obtuse), serrate, dark green, rather glossy, slightly rugose and pubescent at first above, green glabrescent unless on the midrib (lowest leaves shining) beneath, with veins prominently reticulate. Catkins, ♀ only known, fl. May, 1–1½ in. long, on short peduncles with 3–4 small basal leaves; ovaries ovate-conic, silkily tomentose; pedicels pubescent 2–3 times as long as the quadrate nectaries; bracts obovate-spathulate, rounded above and reddish before discolouring at the tip, pubescent; styles and stigmas moderate, about equal in length, somewhat stained with red.

S. aurita × *myrsinites* has been found only in Glen Fiagh, Forfarshire, first in 1889 (No. 18 *suprà*), a form with broad leaves and the earliest nearly round; a year or two later near the same spot, a wet slope high up the glen, a form with the earliest leaves narrower and none of them round. These both have the leaves green beneath, the earliest glossy green, and only later leaves in cultivation at all glaucous-green.

S. saxetana B. White, though supposed by its author to be this hybrid, is excluded from the synonymy, since none of the three forms described (*l. c.* p. 435) show any of the glossy green underleaf of the earlier leaves, which is the crucial test, nor any other satisfactory evidence, of the presence of *S. myrsinites*. Each of them is a form or hybrid of *S. Andersoniana*; No. 462 probably a hybrid with *S. aurita* and *S. phylicifolia*, and the other two plants apparently hybrids with *S. phylicifolia* only.

Salix aurita × myrsinites × Andersoniana.

Syn. *S. myrsinites* × *aurita-nigricans* Linton in Journ. Bot. 1892, 360, 361.

Exs. E. F. & W. R. Linton, No. 57? Hb. E. F. Linton, No. 147.

A bush 4–5 ft. high, with the young branches densely pubescent, becoming ± glabrous by degrees. Stipules broadly ½-cordate, with the acute or acuminate tip twisted to one side. Leaf-blades 1–2 in. long, ovate or oval-acuminate, sometimes a little obovate, the lowest sometimes rounded; serrate-crenate to serrate with obtuse somewhat incurving teeth; pubescent at first then glabrescent and green on the upper surface, densely pubescent beneath, especially on the raised veins, by degrees glabrescent, green; the lower ones glossy green beneath and reticulate as in *S. myrsinites*; all rather coriaceous, and blackening somewhat in drying.

This bush (No. 147) occurred in the Glen Lyon Valley, near Fortingal, Perthshire; probably ♂, as no catkins were seen. The evidence of each of the three factors is clear; the glossy green of the blades and their texture and veining showing *S. myrsinites*; the stipules and incurving teeth of the leaves *S. aurita*, and the dense pubescence and blackening of the foliage *S. Andersoniana*.

The willow issued in the Set as No. 57 has not such certain evidence of the presence of *S. myrsinites* as the above, but was believed to be the triple hybrid by F. B. White as well as the editors of the Set.

SALIX AURITA × ANDERSONIANA.

Syn. *S. coriacea* (Schleich.) Forbes, Sal. Wob. t. 112? B. White, Revision, 409.—*S. aurita* × *nigricans* Seemen, iv. 247.

Exs. Leefe, Sal. exs. i. 17, 20; iii. 78 (*S. lacustris* Schleich.?). Heidenreich (*S. aurita-nigricans*, from Tilsit, Prussia). E. F. & W. R. Linton, Nos. 56, 57? Hb. B. White, Nos. 393, 441.

An erect bush, 4–7 ft. high, with rather slender branches, pubescent at first, at length glabrous; buds shortly oval, hairy, glabrescent. Stipules broadly ½-cordate, tips usually acute, much laterally twisted. Leaf-blades 1–2 in. long, oval to oval-oblong or -obovate, hairy at first, green and ± glabrescent above, rather densely hairy, dull green or glaucous beneath, gradually glabrescent. Catkins coeval or preceding the leaves, fl. April–May; bracts lingulate or obovate, moderately hairy; ovaries glabrous or pubescent, or in a Dumfriesshire form glabrous below the middle, the upper half and the pedicels (which much exceed the nectaries) being pubescent; styles long or of medium length, stigmas rather small.

The plant issued in the Set of British Willows, No. 57, as *S. aurita* × *myrsinites* × *nigricans* perhaps ought to be referred here, as *S. aurita* and *S. Andersoniana* (*S. nigricans*) are the most evident constituents; the glossy upper surface of the leaf-blades and their coriaceous texture suggest a strain of *S. myrsinites*, and the raised reticulation on the surface of some of them and their texture recall *S. arbuscula*; but the catkins show no trace of either.

S. aurita × *Andersoniana* is a rare hybrid, recorded for N. Yorks, Dumfriesshire, Berwickshire, Mid-Perth, and the Clova Valley, Forfarshire. Distribution in Europe unknown to me.

SALIX AURITA × ANDERSONIANA × PHYLICIFOLIA.

Syn. *S. saxetana* B. White, Revision, 436, pro pte.

Exs. Hb. B. White, No. 462 (*S. saxetana*). Hb. E. F. Linton, Nos. 91, 99. Hb. E. S. Marshall, No. 680.

Like *S. aurita* × *Andersoniana* generally, but showing evidence of *S. phylicifolia* in one or more characters, as the dark polished brown bark of one-year-old branches, rapid glabrescence of leaves, which blacken less when drying and are more coriaceous; ovaries usually ± tomentose, rarely glabrous.

From roadside half a mile west of Killin, Mid-Perth (No. 99); from Glen Shee, E. Perth (No. 680), a form with glabrous ovaries. Auchencat Burn, near Moffat, Dumfriesshire (No. 91).

SALIX AURITA × PHYLICIFOLIA Schmalhausen, BZ. xxxiii. 571 (1875). Linton in Journ. Bot. 1892, 360.—*S. ludificans* B. White, Revision, 405.—*S. aurita* × *bicolor* Gürke in Richter-Gürke, Pl. Eur. ii. 21 (1897).

Exs. Leefe, Sal. exs. No. 88 (forsan *S. lutescens* × *phylicifolia*). Hb. B. White, Nos. 67, 188. E. F. & W. R. Linton, No. 58.

Habit of *S. aurita* × *Andersoniana*, with the characters of

S. phylicifolia replacing those of *S. Andersoniana*. The one-year old wood polished dark brown in part at least; twigs sooner glabrescent. Stipules narrower, less prominent and less cut. Leaf-blades rather rigid and coriaceous, brighter green, not blackening at all, sooner glabrous, pale green or glaucous beneath. Catkins with bracts lingulate or oblong-obovate, obtuse or subacute, somewhat ferruginous; ovaries always pubescent, often densely.

Local, if not rare, occurring in subalpine valleys and among mountain rocks, from N. W. Yorks and Dumfriesshire to Perthshire and Forfarshire, Aberdeenshire, Caithness. No European specimens met with.

SALIX AURITA × REPENS.

Syn. *S. ambigua* Ehrh. Beitr. 6, 103 (1791). Sm. in Rees Cycl. 114. Wade, 321. Anderss. Monogr. Sal. 117; in DC. Prodr. xvi. (2), 239. Syme. E. B. viii. 244. Hartman, 367. B. White, Revision, 392.—*S. spathulata* Willd. Sp. Pl. iv. 700, No. 95 (1805).—*S. versifolia* Seringe, Essai, 40 (non Wahlenb.).—*S. aurita-repens* Wimmer, Fl. Schles. 446 (1840); Sal. Eur. 233.—*S. aurita × repens*. Linton in Journ. Bot. 1892, 361. Camus, Monogr. 341. Seemen, iv. 230.

Icon. E. B. S. 2733. Fl. Dan. 2670. Syme, E. B. viii. t. 1355. Camus, Atlas, Pl. 31, fig A–G.

Exs. Seringe, Nos. 60, 66. Wimmer, Sal. Relict. (Herb. Sal.) Nos. 36, 120, 125; Coll. Sal. Nos. 242–244 (a–e). Hb. Borrer. Hb. Boswell (from Orkneys, unnamed). Hb. B. White, Nos. 340, 406. E. F. & W. R. Linton, No. 60 (1, 2).

A low spreading shrub, 1–3 ft. high; stems ascending, more rarely suberect, twigs and buds pubescent at first, soon glabrous. Stipules small or of medium size, $\frac{1}{2}$-ovate to ovate-acuminate. Leaf-blades 1–2 in. long, usually oblong-obovate or oblong-oval, sometimes obovate-lanceolate (var. *spathulata* Willd.), or shortly lanceolate (var. *undulata* Syme); or with larger and more silky leaves (var. *major* Syme); ± narrowed towards the base, with tip acute, often recurved or twisted; serrate, crenate-serrate, or subentire, ± rugose (nerves depressed above and raised beneath); dark green and glabrescent, sometimes grey-pubescent, at least at first above, glaucous and silkily pubescent or subglabrous beneath. Catkins preceding the leaves, in late April or May, shortly stalked with few small silky leaves at the base; filaments somewhat pubescent near the base; ♀ about 1 in. long, dense-flowered, elongate in fruit; pedicels 3–5 times as long as the short quadrate nectaries; bracts oblong to obovate obtuse, pilose upwards; ovaries narrowly conic, silvery-grey with appressed pubescence; stigmas short, thick, subsessile.

Four varieties have had a place in British lists, and are described by Syme (*l. c.*); but these do not include every form, and many examples cannot be fitted into them. It is doubtful whether any varieties of this variable hybrid are worth retaining in the list.

S. aurita × repens is very local, but widely spread, at low levels, from the Orkneys and Shetlands to Cornwall, Sussex, and

Essex. Europe: France, Denmark, Scandinavia, Finland, Germany, and Russia.

9. Salix caprea L. Sp. Pl. 1020. Wade, 349. Seringe, 15. Sm. Engl. Fl. iv. 225; in Rees Cycl. 126. Doell, 496. Anderss. Monogr. i. 75; in DC. Prodr. xvi. (2), 222. Wimmer, Sal. Eur. 55. Syme, E. B. viii. 233. B. White, Revision, 385. Camus, Monogr. 202.—*S. latifolia rotunda* Dill. in R. Syn. ed. 3, 449.—*S. sphacelata* Sm. Fl. Brit. iii. 1066.—*S. hybrida* Vill. Dauph. iii. 778 (1789).

Icon. Hoffmann, Hist. Sal. t. 3, f. 1, 2; t. 5, f. 4. E. Bot. t. 2333 (*S. sphacelata*), t. 1488. Fl. Dan. t. 2603. Forbes, Sal. Wob. t. 122. Camus, Atlas, Pl. 17, a–g (1904).

Exs. Herb. Linn. 50 f, 71 c, 75 (*ectypa*). Wimmer, Sal. Relict. (Coll. Sal. 23). Kerner, Hb. Œsterr. Weiden, 48. Billot, 462. Leefe, Brit. Sal. exs. 61, 63 (f. *androgyna*). E. F. & W. R. Linton, Nos. 19, 54. Hb. B. White, Nos. 47, 271, 272. Toepffer, Nos. 16, 115, 116, 209, 262 (f. *androgyna*).

A shrub or small tree, 10–30 ft. high, branches and buds rather stout, pubescent at first, soon glabrescent as a rule, late summer twigs sometimes retaining their pubescence. Stipules ½-cordate ± acuminate often dentate or deeply cut. Leaves large; blades 2–5 in. long, broadly oval or ovate-oblong, often rounded at the base, more rarely subcordate, not unfrequently obovate and narrowed (almost cuneate) below (chiefly in hilly regions of the North); somewhat undulate, crenate, or obscurely crenate-serrate or entire, softly pubescent but ± glabrescent and dark green above, grey very softly and densely pubescent beneath, and usually not glabrescent. Catkins appearing in March or April before the leaves, subsessile with a few small leaves not always foliaceous at the base; ♂ ovate-oblong ¾–1½ in. long, very silky, filaments glabrous or slightly hairy near the base; ♀ elongating 1½–3 in. long, at length lax; bracts oblanceolate acuminate subacute, clothed with long silky hairs; pedicels at length 4–6 times as long as the short nectaries; ovaries ¼–⅓ in. long ovate-conic; style short rarely elongate, usually shorter than the stigmas.

S. caprea differs from *S. cinerea* in its broader leaves which are softly silky to the touch beneath and deeper green above, and in its larger catkins with pointed bracts. It differs from *S. aurita* in its larger broader less rugose and usually softer leaf-blades, and in its stouter twigs and catkins. It differs from both in having no striæ on the young wood beneath the bark.

"*S. sphacelata* Sm." is a form of *S. caprea* with entire leaf-blades and usually exstipulate leaves. Such a form occurs in woods and on rocks in Scotland, but seems to be rather an undeveloped state than a distinct variety.

In Smith's herbarium the British specimen (labelled "*Salix sphacelata*, Mr. E. Forster's garden, Hale End, May 27, 1825") is a form of *S. cinerea* with rather short, broadly obovate leaf-blades, which are grey with dense pubescence in their early state. Another sheet, from Switzerland, on the label of which is pencilled "same as *sphacelata*, Fl. Brit., Cycl. 125," is entire-leaved *S. caprea*. This remark is, I believe, in Smith's handwriting.

A form has been found in E. Norfolk which has the leaves softly pubescent only while young, the adult leaves being glabrous and harsh to the touch beneath. Wimmer (*l.c.* p. 57), in mentioning leaf-variations, remarks, "in montanis sæpe foliis subtus fere glabris occurrit"; this, however, is not the case with plants on the mountains of Britain.

Gaudin (Fl. Helv.) describes *β angustifolia*, *γ rotundifolia* and *δ alpina*, the last of which is said to be the same as *S. sphacelata* Sm.; Séringe (*l. c.*) gives ten or eleven varieties; Seemen quotes *β* and *γ* of Gaudin, and adds another which he named *D. villosa*, from Asia. But none of the European forms seem to be well-marked distinct varieties or worth retaining.

S. caprea is indigenous and occurs in almost every county of Great Britain, from the south coast to Sutherlandshire, also in the Shetlands. Of no commercial value, it is rarely planted, but makes itself at home on nearly any soil, usually on drier ground than *S. cinerea*, in woodland and hedgerow rather than by water, at any elevation from near sea-level up to 2000 ft. in the Highlands (exceptionally at 2500 ft. in the Breadalbanes); distributed generally through Ireland. It is found throughout Europe, from Spain, Italy, and Greece, northward to Iceland, Scandinavia and N. Russia (66°); in Northern and Central Asia, eastwards to the Korea, Kamskatcha, and Japan.

S. caprea × *aurita* (p. 40).
× *cinerea* (p. 48).
× *cinerea* × *phylicifolia* (p. 49).
× *lanata* (p. 49).
× *lapponum* (p. 50).
× *myrsinites* (p. 51).
× *Andersoniana* (p. 52).
× *phylicifolia* (p. 52).
× *repens* (p. 53).
× *viminalis* (p. 30).

SALIX CAPREA × CINEREA.

Syn. *S. caprea-cinerea* Wimmer, Flora, xxxii. 43 (1849); Sal. Eur. 199.—*S. Reichardti* Kerner, Nied. Oesterr. Weiden, 249 (1859). B. White, Revision, 386.—*S. caprea* × *cinerea* Camus, Monogr. 326.—*S. cinerea* × *caprea* Seemen, iv. 214.

Icon. E. Bot. t. 1437. Forbes, Sal. Wob. t. 127.

Exs. Wimmer, Sal. Relict. (Coll. Sal. 185). Hb. B. White, Nos. 56? 237. E. F. & W. R. Linton, No. 55. Toepffer, Nos. 58, 59, 263.

The hybrids of *S. caprea* and *S. cinerea* are not easy to detect, as the two species have so much in common. The influence of *S. caprea* is likely to appear in the earlier glabrescence of the twigs and buds, the broader subcrenate or obscurely serrate leaf-blades clothed at first with soft dense white pubescence, the more pointed stipules, the acuminate floral bracts and the larger catkins. The characters to expect from the influence of *S. cinerea* are the sub-persistent dusky pubescence on twigs and buds, striæ on the two-year-old wood under the bark, the narrowed or longer and more serrate leaf-blades, showing some rust-coloured hairs but becoming subglabrate and rather harsh beneath; the more rounded and less dentate stipules, the catkins and ovaries rather smaller, and the bracts more obovate, blunt or rounded.

All these influences may not appear together, and many examples resemble one parent more than the other; then clear signs must be looked for of the less evident parent.

S. caprea × *cinerea* is most easily confused with some forms of the variable *S. aurita* × *cinerea*. It is far from common, having been seen only from Dorset, Worcestershire, Glamorganshire, Derbyshire, Perthshire, and (?) Banffshire. Europe: France, Germany, Scandinavia, Russia.

SALIX CAPREA × CINEREA × PHYLICIFOLIA?

Syn. *S. tephrocarpa* B. White, Revision, 406 (non Wimmer, Sal. Eur. 205).

Exs. Hb. B. White (specimens unnumbered).

A shrub 3–6 ft. high, branches stout, dull brown, here and there polished dark brown, young twigs pubescent but soon glabrous. Stipules broadly ½-cordate, obliquely acuminate. Leaf-blades 2–3 in. long, ovate-oboval to obovate-oblong, subentire, crenate-serrate or incurved-serrate, with tip mucronate or shortly acute and base subcuneate, softly pubescent at first, mostly soon glabrescent but some early leaves retaining the pubescence of *S. caprea*, green above, very glaucous beneath. Catkins ♀ the only known, flowering in April, 1½–2 in. long, bracts large obovate obtuse, silkily pubescent, blackened in fully half the upper part; ovaries long-conic white tomentose; pedicels three times as long as the short broad nectaries; style medium long.

The contrast between the large blackened part of the bracts and the white tomentose ovaries gives a striking appearance to the inflorescence of this hybrid.

The specimens in Dr. White's herbarium, all from a single large bush by the river Tay, near Balmacneil, Perth, show good evidence of *S. phylicifolia* in the style, bracts, and polish of some parts of the year-old wood; of *S. caprea* in the partially crenate softly villous leaf-blades and the size of the ovaries; and of *S. cinerea* in the ashen colour and shape of the leaves, and their underneath clothing of numerous rust-coloured hairs.

S. tephrocarpa Wimmer in the Sal. Relict. (Coll. Sal. 259), appears to be a soft-leaved form of *S. aurita* × *cinerea*, such as occurs in Dorset or Derbyshire, and no doubt elsewhere, and is quite distinct from B. White's plant.

SALIX CAPREA × LANATA. See Journ. Bot. 1898, 123.

Exs. Herb. Borrer (ex hb. J. H. Balfour, 5 Salix —). E. F. & W. R. Linton, No. 88.

A dwarf shrub, with stem trailing on rocks or ascending and suberect, older bark grey, branches darkish brown, buds yellowish-to chestnut-brown, roundly ovate, densely pubescent, the woolly pubescence ± persistent towards the apex. Leaf-blades obovate rounded above often with a submucronate twisted tip, obscurely crenate and somewhat waved along the margins, very woolly-pubescent above with long silky hairs at first, then glabrescent, densely pubescent beneath at first, partially glabrescent but with long silky hairs persistent on the nerves, reticulate on the under side of the leaves (like *S. lanata*).

The above description of foliage is made from the sheet in Herb. Borrer, labelled "Ex hb. J. H. Balfour 5 *Salix* —, Glen Isla, Aug. 1837." Remarks are added on a slip—"5 Why not *S. lanata*? W. B." "Probably *S. caprea* by its stipules, 1847." The stipules are not in evidence now.

A ♂ plant of *S. caprea* × *lanata* (No. 282), raised in the garden by design, and issued in the Set of British Willows, No. 88, furnishes some more particulars of this new hybrid. Stipules large, rounded or reniform-rounded, often shortly or obliquely pointed. Leaf-blades 1–3 in. long, shortly petioled, lower oval-oblong shortly acuminate, sometimes becoming nearly glabrous, upper broadly oval with short acute often twisted tip, rounded or subcordate at the base, entire or obscurely crenate, rarely a little denticulate, softly pubescent, dull green glabrescent above, grey with pubescence and reticulate-veined beneath. Catkins 1½–2 in. long by 1 in. or more broad, remarkably silky, ovate-oblong; bracts narrowly ovate- to obovate-acuminate, acute, clothed with abundant long yellowish-white silky hairs; stamens ⅓ in. to nearly ½ in. long, very numerous, filaments thinly hairy in the lower half; anthers rather small in proportion, tipped with red at first; nectaries shortly oblong.

× SALIX BALFOURII (*S. caprea* × *lanata*), nov. hybr. Frutex humilis ramulis subcrassis novellis pubescentibus; laminis obovatis ad apicem rotundatis vel sæpe mucronatis, obscure crenatis, supra lanato-villosis demum glabratis, subtus pilis ad nervos reticulatos persistentibus dense vestitis.

A quâ diverse variat No. 282 (arte orta) laminis 1–3 unc. longis ovali-oblongis ovalibusve acuminatis vel acutis glabrescentibus integris vel obscure crenatis; stipulis foliaceis rotundis sæpe oblique acuminatis; julis ♂ 1½–2 unc. longis, 1 unc. latis, bracteis anguste obovatis-rhombicis acuminatis longe ac dense sericeis; staminibus ⅕ unc. longis, filamentis infra parce pilosis, nectariis longis oblongis.

Named after J. H. Balfour, formerly Professor of Botany in the University of Edinburgh, from whose herbarium the original specimens came. Found only in Glen Isla, Forfarshire, where also *S. lanata* occurred.

SALIX CAPREA × LAPPONUM.

Syn. *S. caprea-lapponum* Wimmer, Sal. Eur. 192.—*S. Læstadiana* Hartman, Skand. Fl. ed. 3, 237. Anderss. DC. Prodr. xvi. (2), 278 (*a canescens*).—*S. caprea* × *lapponum* Seemen, 271.

Exs. Hb. E. S. Marshall, Nos. 706, 2772. E. F. & W. R. Linton, No. 39.

A small shrub, 2–4 ft. high, spreading, ascending; young branches and buds hoary-pubescent. Stipules 0 or minute. Leaf-blades 1–2 in. long, obovate-oblong to oval-lanceolate, narrowed to both ends, entire or crenate-serrate, pubescent or greyish-green above, silvery with silky pubescence beneath. Catkins coeval with the leaves, fl. May, June; ♂ flowers not seen; ♀ catkins 1–1½ in. long, peduncles with few small leaves below, dense-flowered, hardly elongate; bracts oblong-obovate, ± pointed, silky, discoloured upwards; pedicels much longer than the shortly oblong nectaries; ovaries finely grey-pubescent; styles short, about as long as the stigmas.

By the Lochy Burn, Glen Shee, E. Perthshire (No. 706, E. S. Marshall); a barren bush with larger leaves, probably ♂, near by (E. F. L.). Clova, Forfarshire (No. 2772, E. S. Marshall). Reported from Scandinavia, E. Prussia, Silesia, Russia, Lapland. In hb. Chas. Bailey are good examples labelled "Fl. suecica—Högheden Lapponiæ Pitensis, Dr. C. Håkansson, 1880"; and "Jemtland: Ocke vi, vii. 87, C. F. Sundberg, ♀."

Salix caprea × myrsinites Linton in Journ. Bot. 1894, 201. Seemen, 255.

Exs. Hb. E. F. Linton, Nos. 46, 299; Suppl. Set, No. 115.

A small bush with dark branches, pubescent at first; buds pubescent, then gradually glabrescent. Stipules ½-cordate ± acuminate and serrulate. Leaf-blades 1½–2 in. long, shortly oblong-obovate, acute or submucronate, crenate-serrate, softly pubescent at first, shining green, reticulate and glabrescent above, paler green (lower ones shining), reticulate and retaining some pubescence on the nerves beneath. Catkins 1 in. long, fl. April (in the garden), bracts narrowly obovate-oblong, bluntly pointed, silky, reddish below the blackened tip; anthers reddish to reddish-yellow; ♀ 1–1½ in. long, elongating a little; ovaries ovoid-conic, grey-pubescent; pedicels 2–3 times as long as the square nectaries; styles and stigmas crimson, rather short.

The description given above is drawn from two plants raised in the garden from *S. caprea* ♀ and *S. myrsinites* ♂, and numbered 299 *α* and 299 *β*. The wild plant, believed to be the female of this hybrid (No. 46), from Glen Fiagh, Clova, differs in having rather broader more mucronate leaf-blades, with rather more distinct *S. myrsinites* serrations in many of the leaves, obtuse oblong bracts and rather smaller stigmas and styles; but is otherwise much like the garden hybrid. It bears a good deal of resemblance to *S. aurita* × *myrsinites* from the same glen, only with broader, more crenate, and more softly clothed leaf-blades and larger catkins; just the differences that might be expected from *S. caprea* taking the place of *S. aurita*.

A ♂ plant (No. 86), also from Glen Fiagh, was supposed to be this hybrid, but is probably *S. Andersoniana* × *myrsinites*.

S. caprea × *myrsinites*, having been found only in Glen Fiagh, Forfarshire, is endemic to the British Isles. The ♀ plant was described in the *Journal of Botany*, 1894, p. 201, having been grown from cuttings in the garden and kept for several years.

SALIX CAPREA × ANDERSONIANA.

Syn. *S. latifolia* Forbes, Sal. Wob. No. 118. B. White, 406. —*S. caprea-nigricans* Wimmer, Sal. Eur. 226. — *S. caprea* × *nigricans* Seemen, 243.

Icon. Forbes (*l. c.*).

Exs. Leefe, Sal. exs. iii. 69. Hb. B. White, No. 32. E. F. & W. R. Linton, No. 38. Hb. W. R. Linton, Nos. 159a, 302.

A shrub, 5–10 ft. high, twigs and buds clothed with subpersistent pubescence. Stipules foliaceous, roundish, obliquely pointed, upper often acuminate. Leaf-blades oval- to obovate-oblong shortly acuminate, somewhat narrowed at the base, crenate-serrate or crenate, densely pubescent on both sides at first, glabrescent and dull green on the upper surface, grey-pubescent beneath, blackening somewhat when dried. Catkins preceding the leaves in May, ♂ about 1 in. long, with a few small basal leaves, ♀ 1–1¼ in. long, not much elongate; bracts narrowly obovate, obtuse to subacute hairy; ovaries grey-tomentose; pedicels 3–4 times as long as the shortly oblong or quadrate nectaries; styles and stigmas usually shorter than in *S. Andersoniana*.

A hybrid with ♀ flowers, produced in the garden at Shirley, with obovate acuminate leaf-blades rather coarsely crenate-serrate, differs but little from the above description.

S. caprea × *Andersoniana* has been found in Roxburghshire (hb. A. Ley)?, Dumfriesshire, Perthshire, and Forfarshire. Europe: Scandinavia, Finland, Germany, Austria, and Tirol.

SALIX CAPREA × PHYLICIFOLIA.

Syn. *S. caprea-phylicifolia* Wimmer, Denkschr. d. Schles. Gesellsch. 67. Seemen, iv. 244.—*S. caprea-Weigeliana* Wimmer, Sal. Eur. 215, pro parte?

Exs. In Hb. Bailey are four sheets of this hybrid, all labelled *S. laurina*, viz. (1) Wirtgen Herb. Pl. Sel. Fl. Rhenan. vi. 260; (2) Reichb. Fl. Germ. 1020; (3) Wimmer 90 (*ex hort. Berol.*); and (4) "*S. laurina* (*S. bicolor* × *caprea*), Thur., Weimar, J. Bornmüller." Hb. E. F. Linton, No. 78 (36).

A large shrub, with branches soon becoming glabrous and at length dark brown polished in parts; buds hairy only at first. Stipules ½-cordate rounded to acuminate. Leaf-blades 1½–2½ in. long, ovate or obovate, submucronate to subacuminate, ovate or rounded below, crenate or crenate-serrate, softly villous on both sides while young, green, slightly shining and glabrescent above, glaucous-green and with partially persistent pubescence on the nerves beneath. Catkins, flowering in April or May, ♀ about 1 in. long, somewhat elongate in fruit; bracts spathulate or oblong, subacute or subobtuse, hairy; ovaries ovate-conic tomentose; pedicels much longer than the quadrate or shortly oblong nectaries; style and stigmas moderately long, about equal in length.

Perthshire plants from Glen Shee (hb. E. S. Marshall, No. 712) and from Killin may with some certainty be assigned to this hybrid. A curious plant from the Clova Valley, some 3 m. below Clova, Forfarshire (hb. E. F. Linton, No. 36 and 78), answers very nearly to the description above, but has the ovaries densely pubescent in the upper half and glabrous below the middle, the pedicels pubescent near the base and glabrous above, and the nectaries rather long oblong, and is probably *S. caprea* × *Andersoniana-phylicifolia* rather than the simple hybrid *S. caprea* × *phylicifolia.*

S. caprea × *phylicifolia* is an extremely rare combination in Britain, and apparently elsewhere. It has been much confused for many years past with *S. laurina* Sm., which is the corresponding hybrid of *S. cinerea* with *S. phylicifolia*, and of more frequent occurrence. Andersson interpreted *S. laurina* as *S. caprea* × *phylicifolia* (DC. Prodr. xvi. (2), 250), and his views were adopted by F. B. White (Revision, p. 403), and rather commonly taken for granted in this country. For an account of *S. laurina* Sm. see *S. cinerea* × *phylicifolia*, p. 57.

SALIX CAPREA × REPENS.

Syn. *S. caprea-repens* (Lasch) Wimmer in Denkschr. Schles. Gesellsch. (1853), 170. Wimmer, Sal. Eur. 237.—*S. caprea*×*repens* Seemen, iv. 228.

Exs. Wimmer, Sal. Relict. (Herb. Sal. 73; Coll. Sal. 246). Hb. Kew, *S. repens-caprea* Goteborg (Sweden), 1878, A. P. Winslow; *S. ambigua* Ehrh. Goteborg, 1881, A. P. Winslow; both very good *S. caprea* × *repens*. Hb. E. S. Marshall, Nos. 2453, 2959.

A dwarf shrub, with the habit of *S. repens* in British forms; twigs pubescent, sooner or later glabrescent. Stipules roundish, blunt or acuminate. Leaf-blades 1–2 in. long, rather broadly oval rounded below with a short tip often twisted, crenate-serrate or subentire, softly and densely pubescent especially beneath while young, gradually and slowly glabrescent. Catkins slightly preceding the leaves in April, shortly peduncled with 2–3 small basal leaves, ♂ 1 in. long cylindric, bracts subobtuse; ♀ catkins (from Hamburg and E. Prussia) 1–1½ in. long, bracts oblong acuminate (Tilsit) or oblong-obovate (Hamburg); ovaries gradually acuminate to a short style, grey-tomentose; styles and stigmas nearly equal.

Very rare; Glen Callater, Aberdeenshire; Ardskinid, Sutherland. Europe: Scandinavia, Finland, Germany, Silesia, Bohemia, Tirol.

10. SALIX CINEREA L. Sp. Pl. 1021. Sm. in Rees Cycl. 94; Engl. Fl. iv. 215. Doell. 495. Anderss. Monogr. i. 71; in DC. Prodr. xvi. (2), 221. Wimmer, Sal. Eur. 47. Syme, E. B. viii. 230. B. White, Revision, 378. Camus, Monogr. 181. Seemen, iv. 93.

Syn. *S. acuminata* Miller, Gard. Dict. No. 14 (1768). Seringe, Essai, 12. — *S. atrocinerea* Brotero, Fl. Lusit. i. 31 (1804).—*S. aquatica* Sm. Fl. Brit. iii. 1065; in Rees Cycl. 118.—*S. oleifolia* Sm. (non Vill.) Fl. Brit. iii. 1065; in Rees Cycl. 119.

Icon. Hoffmann, Hist. Sal. t. 6, f. 1, 2; t. 22, fig. 2 (*S. acuminata*). Fl. Dan. t. 2601. E. Bot. t. 1402 (*S. oleifolia*), t. 1437 (*S. aquatica*), t. 1897 (*S. cinerea*, not very typical). Forbes, t. 125–127. Anderss. Monogr. t. iv. f. 44. Syme, E. B. viii. t. 1327-1329.

Exs. Hb. Linn. Nos. 74, 75 (2). Wimmer, Sal. Relict. (Coll. Sal. 27b, 28). Billot, No. 2364. Seringe, Nos. 27, 95. Leefe, Sal. Brit. exs. Nos. 39, 44; Sal. exs. No. 46. E. F. & W. R. Linton, Nos. 36, 61, 62. Hb. B. White, Nos. 17, 21, 33, 158, 159, 176, 193, 226.

A large shrub, becoming under favourable circumstances a small tree, 20–30 ft. in height, much branched; young branches rather stout, torulose, tomentose, the pubescence usually persistent and becoming blackish in the winter; buds oval similarly pubescent; wood under the peel, when 2–3 years old, streaked with short striations. Stipules sessile, usually rounded and entire, or sometimes ± dentate. Leaves very variable; blades 1–3 in. long, obovate-acuminate, narrowly obovate-lanceolate (*S. oleifolia* Sm.), or broadly oblong-obovate or roundish obovate with a short tip (*S. aquatica* Sm.); usually narrowed and not unfrequently cuneate to the base; when well developed serrate or crenate-serrate in the upper half, ± pubescent and dull or greyish-green above, ashen or ashen-green below, and usually pubescent with both white and rust-coloured hairs; lower leaf-blades commonly entire and ± glabrescent. Catkins flowering in March and into April before the leaves, subsessile, with scarcely any leaves at their base; ♂ about 1 in. long, ovoid to ovoid-oblong, upper usually flowering first, nectaries quadrate or oblong, filaments pilose in their lower half, anthers yellow, rarely at all reddish at first; ♀ ovoid, elongate to $1\frac{1}{2}$ or 2 in. long, then cylindric; bracts broadly or narrowly obovate, or oblong-obovate, obtuse or rounded at the tip, more rarely simply oblong and then sometimes subacute, always ± clothed with silky hairs; pedicels at length 3–5 times as long as the short quadrate (or more rarely oblong) nectaries; ovaries ovoid-conic, grey-tomentose becoming grey-green; styles usually very short, shorter than the rather short stigmas, but occasionally, at least in the South of England, as long as that of *S. phylicifolia.*

Smith described two species, *S. aquatica* and *S. oleifolia*, which have long been relegated to the position of varieties, and latterly of mere forms, of *S. cinerea.*

Var. *aquatica* (Sm.).

Syn. *S. aquatica* Sm. Flor. Br. 1065; in Rees Cycl. 118; Engl. Fl. iv. 218.

Icon. E. Bot. t. 1437. Forbes, No. 127.

A bush, rarely a tree. Stipules rounded, not conspicuous. Leaf-blades about 2 in. long, obovate, serrate upwards, soft, dull greyish-green above, glaucous or ashen and shortly pubescent beneath. In other respects like *S. cinerea.*

Var. *oleifolia* (Sm.).

Syn. *S. oleifolia* Sm. Fl. Br. 1065; in Rees Cycl. No. 119; Engl. Fl. iv. 219.

Icon. E. Bot. t. 1402. Forbes, No. 126.

A shrub of hedgerows, growing into a tree, if not cut back; branches softly pubescent when young; buds large and prominent. Stipules 0 or small. Leaf-blades 2–3 in. long, narrowly oblong-lanceolate, usually broadest above the middle, narrowed to each end; subentire or with minute teeth, firm in texture, subcoriacous; green and subglabrous above, pubescent below and becoming rust-coloured with rusty hairs. Not differing from the type in flowers or fruit.

Such are Smith's descriptions condensed; and his distinctions are useful for classifying specimens of a variable species in large herbaria. In these, forms of *S. lutescens* are often found named *S. oleifolia* Sm.; and *S. aquatica* has sometimes proved to be a form of *S. caprea* × *cinerea*; but after deducting the hybrids which have been confused with and labelled *S. aquatica* or *S. oleifolia*, there still remain forms of *S. cinerea*, which answer to the descriptions of these two Smithian "species."

S. cinerea is recorded for nearly all the counties of England and Scotland, and probably occurs in all, and for all the divisions of Ireland. It is found through almost the whole of Europe; in Eastern and Northern Asia; and N. Africa.

S. cinerea × *aurita* (p. 41).
× *aurita* × *Andersoniana* (p. 42).
× *aurita* × *phylicifolia* (p. 42).
× *caprea* (p. 48).
× *Andersoniana* (p. 55).
× *Andersoniana* × *phylicifolia* (p. 56).
× *phylicifolia* (p. 56).
× *purpurea* (p. 25).
× *repens* (p. 57).
× *viminalis* (p. 31).

[SALIX CINEREA × MYRSINITES Linton in Journ. Bot. (1898), 124. Seemen, iv. 255.

Exs. E. F. & W. R. Linton, No. 92. Hb. E. F. Linton, No. 278.

A compact, much-branched bush, 3–5 ft. in height, with dark brown branches, somewhat polished when at length glabrous. Stipules broadly ½-cordate acuminate, subpersistent. Leaf-blades 1½–2 in. long, usually ovate-oblong, crenate to crenate-serrate, shining above, glaucous-green beneath (earliest leaves shining green). Catkins, ♂, appearing before the leaves in early May, 1–1½ in. long, filaments pubescent in the lower half, anthers dull red shading off to yellow.

This handsome shrub was raised in a Bournemouth garden from *S. cinerea* ♂ and *S. myrsinites* ♀, and has been sent out to Botanic Gardens as No. 278. It is recorded by O. von Seemen (*l. c.*) from the Tirol.]

SALIX CINEREA × ANDERSONIANA.

Syn. *S. strepida* Forbes, Sal. Wob. No. 100. B. White, Revision, 408. — *S. vaudensis* Forbes, No. 117.—*S. nigricans* × *cinerea* Wimmer, Denkschr. Schles. Gesell. Väterl. cult. 189 (1853). —*S. puberula* Doell. 518. Anderss. DC. Prodr. xvi. (2), 249.— *S. cinerea-nigricans* Wimmer, Sal. Eur. 224.—*S. cinerea* × *nigricans* Linton in Journ. Bot. 1892, 359.

Icon. Forbes, Nos. 100, 117.

Exs. F. Schultz, Hb. Norm. No. 1654 (*S. vaudensis* Forbes). Leefe, Sal. exs. No. 10 (*S. vaudensis* Forbes), No. 93 (*S. nigricans* Sm.). Wimmer, Sal. Relict. (Coll. Sal. No. 74). Hb. Magnier, No. 3662. Hb. B. White, Nos. 57, 58. E. F. & W. R. Linton, No. 93.

A large, much-branched shrub, young branches and buds persistently pubescent through the winter. Stipules leafy and conspicuous, $\frac{1}{2}$-cordate, ± acuminate. Leaf-blades very variable, obovate-oblong to obovate-lanceolate (as in *S. strepida* Forbes), oval-obovate (as in *S. vaudensis* Forbes), or oblong-acuminate; ± pubescent above and dull green, sooner or later glabrescent, glaucous and more hairy beneath. Catkins on leafy peduncles, flowering in late April or May rather before the leaves; ♀ $1\frac{1}{2}$–2 in. long, bracts oboval-oblong, usually obtuse, clothed with long pubescence; ovaries white-tomentose turning grey-green; pedicels 2–4 times as long as the short quadrate nectaries; styles long or medium long, with shorter usually undivided stigmas.

Of specimens in hb. B. White, No. 57, collected by C. McIntosh from an island in the River Tay near Kinnaird House, and No. 58, from Woody Island, show both parents clearly. In some other specimens, the evidence of *S. Andersoniana* is more doubtful; Dr. White relied too much on the presence of a good style as proving hybridity with *S. Andersoniana* or *S. phylicifolia*, unaware that *S. cinerea* sometimes has a fairly long style, where neither of these two species occur to account for it.

S. cinerea × *Andersoniana* has been found in N. Yorks and Northumberland, in Dumfriesshire, Mid and East Perthshire, and Forfarshire. In Europe it is reported from France, Germany, Switzerland, Tirol, Austria, and Sweden.

SALIX CINEREA × ANDERSONIANA × PHYLICIFOLIA, nov. hybr.

Specimens of this combination do not differ obviously from forms of *S. Andersoniana* × *phylicifolia*, but show the influence of *S. cinerea* in the leaves or stipules, in the bracts or stigmas, and in the striæ of the two-year old wood.

A plant labelled "*S. Weigeliana* Willd. × *S. nigricans* Sm., High Force, Teesdale, June, 1890, H. E. Fox," issued through the Botanical Exchange Club, was recognized in my herbarium by S. J. Enander as this triple hybrid; also, with less confidence, specimens from a bush near Killin, Perthshire, and from another at Clova, Forfarshire. A good intermediate blend of the three parent species is my No. 91 from Moffat, Dumfriesshire; also No. 704, *cult.* ex hb. E. S. Marshall, orig. Glen Shee, E. Perth. All of these are ♀ plants.

SALIX CINEREA × PHYLICIFOLIA E. F. & W. R. Linton in Journ. Bot. 1892, 359.

Syn. *S. laurina* Sm. in Trans. Linn. Soc. vi. 122 (1802). Syme, E. B. viii. 235. Anderss. Monogr. 152.—*S. bicolor* Sm. Engl. Fl. iv. 178.—*S. Wardiana* (Leefe MS.) B. White, Revision, 403.

Icon. E. Bot. t. 1806, 2795 (*S. tenuifolia*, the plant from Kirby Lonsdale); Syme, E. B. viii. t. 1333.

Exs. Hb. Borrer ("*S. laurina*? Killin? 1810"; "Garden plant from Sir J. E. Smith"). Leefe, Sal. Brit. exs. No. 43; Sal. exs. Nos. 3, 38, 60, 62. Hb. Boswell Syme ("*S. laurina*, Shrewly Pool, Warwickshire, H. Bromwich"). E. F. & W. R. Linton, No. 14.

A shrub or small tree, 6–18 ft. high; branches pubescent at first, at length glabrous and dark brown, 1–2-year old wood showing some polish in places, and some striæ beneath the bark. Stipules small, ovate to ovate-lanceolate, often absent. Leaf-blades 2–4 in. long, obovate to obovate-oblong, shortly acuminate, ± narrowed to the base, crenate-serrate, or serrate in the upper part, pubescent on both sides while quite young, deep green glabrescent and somewhat shining above, glaucous glabrescent beneath. Catkins coeval with the leaves, fl. May; ♂ not seen; ♀ 1–2 in. long, on short leafy peduncles or subsessile, dense-flowered, becoming rather lax in fruit; bracts oblong or obovate-oblong, blunt or rounded, pilose; pedicels 2–4 times as long as the short quadrate nectaries; ovaries white-tomentose, then grey-green with pubescence; styles long or at least longer than the stigmas, which are usually undivided.

It has been customary to follow Andersson in regarding *S. laurina* Sm. as *S. caprea* × *phylicifolia*. Wimmer appears at first sight to do the same, discussing *S. laurina* Sm. under his *S. caprea-Weigeliana*. But he remarks that it is open to doubt whether his plant is the same as *S. laurina* Sm., since Smith's description does not agree with his (Wimmer's) specimens; and later on, he quotes Meyer's suspicion that the *S. laurina* of botanical gardens on the Continent, all originating from an English stock, may have been produced in gardens from a cross with *S. cinerea* (Sal. Eur. p. 216; *cf.* p. 78). From a study of descriptions by Smith and others, and of what may be called authentic specimens (*e. g.* in Hb. Borrer and in Leefe's Sets), I have long been convinced that *S. laurina* Sm. is *S. cinerea* × *phylicifolia*, a hybrid for which there are several British stations, and not *S. caprea* × *phylicifolia*, which is extremely rare, and of which I have seen no examples in British herbaria.

S. cinerea × *phylicifolia* has been found in Warwickshire, and from Yorkshire to the border; in Dumfriesshire, Dunbartonshire, Perthshire, and Forfarshire, in Scotland. It occurs in Scandinavia, but apparently not in Central Europe, otherwise than in botanical gardens.

SALIX CINEREA × REPENS.

Syn. *S. repens-cinerea* Wimmer in Denkschr. Schles. Ges. 171 (1853); Sal. Eur. 236. B. White, Revision, 394 (as *S. caprea* × *repens*). Seemen, iv. 226.

Exs. Wimmer, Sal. Relict. (Herb. Sal. No. 1; Coll. Sal. No. 245). E. F. & W. R. Linton, Nos. 63, 94.

A dwarf shrub, with branches 2–3 ft. long, prostrate or slightly ascending, hoary-pubescent at first, buds and upper parts of the twigs shortly pubescent into the winter. Stipules frequent, roundly ½-cordate to ovate-acuminate. Leaf-blades ½–2 in. long, oblong-obovate in one form, broadly or narrowly oval or ovate-oblong in another, rounded at or narrowed to the base, obtuse or mucronate or shortly pointed at the tip, which is straight or twisted, usually subentire, sometimes crenate or denticulate, dull or grey-green at first, soon glabrescent above, ashen or silvery with dense pubescence beneath, only partially glabrescent. Catkins 1–1½ in., fl. April, on leafy peduncles; bracts spathulate, pubescent; ovaries slender conic to ovate-conic, tomentose to grey-green with pubescence; pedicels pubescent, about as long as the ovaries, 3–4 times as long as the short quadrate nectaries; styles short, about as long as the stigmas. The ♂ plant has not been seen.

Rare and local; in Scotland only in the British Isles; in the Clova Valley, below Clova, Forfarshire, Armadale, Melvich, and Tongue Bay, in Sutherland. In Europe it has been reported from France, Germany, Bohemia, Tirol, and Scandinavia.

viii. ARGENTEÆ.

11. SALIX REPENS L. Sp. Pl. 1020. Sm. Fl. Brit. 1061; in Rees Cycl. 100–103; Engl. Fl. iv. 209. Wade, 276. Doell, 501. Anderss. Monogr. 113; DC. Prodr. xvi. (2), 237. Wimmer, Sal. Eur. 114. Syme, E. B. viii. 246. B. White, Revision, 389. Camus, Monogr. 161. Seemen, iv. 123.—*S. repens* L. *α repens β fusca*, *γ prostrata*, *δ ascendens*, *ε incubacea*, *ζ argentea*, Babington, Man. Brit. Bot. ed. 9, 383.—*S. depressa* Hoffmann, Hist. Sal. i., 63. Séringe, Essai, 9. — *S. argentea* Sm. Fl. Brit. 1059; Engl. Fl. iv. 206. Wade, 266.—*S. fœtida* and *β parvifolia* Sm. Engl. Fl. iv. 208.—*S. fusca* L. Sp. Pl. 1020. Sm. Fl. Brit. 1060; Engl. Fl. iv. 210.—*S. prostrata* Sm. Fl. Brit. 1060; in Rees Cycl. 105; Engl. Fl. iv. 211.—*S. incubacea* L. Sp. Pl. 1020. Sm. Engl. Fl. iv. 212; in Rees Cycl. 108.—*S. pumila angustifolia, pronâ parte cincreâ* Dill. in R. Syn. ed. 3, 447.

Icon. E. Bot. t. 183, t. 1960 (*S. fusca*), t. 1959 (*S. prostrata*), t. 1962 (*S. ascendens*), t. 1961 (*S. parvifolia*, E. B. S. t. 2600), t. 1364 (*S. argentea*). Hoffm. Hist. Sal. tt. 15, 16 (*S. depressa*). Forbes, tt. 78–84. Fl. Dan. t. 2605 (*S. repens argentea*). Syme, E. B. viii. tt. 1356–1362. Camus, Atlas, Pl. 14.

Exs. Hb. Linn. Nos. 58b, 59, 61–64, 66, 82, 85, 86. Hb. Smith, *S. fusca*, *S. prostrata*, *S. incubacea*, *S. argentea*, and *S. arenaria* (see note below). Seringe, Nos. 11, 35, 36, 61, 62. Leefe, Sal. Brit. exs. Nos. 86–88. Wimmer, Sal. Relict. (Coll. Sal. Nos. 111–115). Baenitz, Hb. Europ. Hb. B. White, Nos. 365, 366, &c. E. F. & W. R. Linton, Nos. 68–71. Toepffer, Nos. 81–84, 143.

A dwarf shrub, branching from the base, with stems 1–3 ft. long, usually prostrate or somewhat ascending, more rarely erect; branches slender, spreading, usually silkily pubescent at first; buds curtly oval or even subglobose, pubescent, soon glabrous. Stipules usually absent, lanceolate or ovate-lanceolate on strong shoots, often substipitate. Leaf-blades ¼–2 in. long, shortly petioled, narrowly or broadly oblong or oblong-lanceolate acute and ± narrowed to the base, more rarely oval (var. *parvifolia*), with straight or twisted or recurved tip, entire, subentire, or serrate with small and distant teeth or denticulations; reticulate when dry with raised veins, green or grey-pubescent at first, ± glabrescent above then often shining, glaucous ± pubescent with adpressed silky hairs beneath which are often deciduous; often blackening when dried; margins commonly reflexed. Catkins usually flowering before the leaves, in May, sometimes coeval; ♂ $\frac{1}{4}$–$\frac{3}{4}$ in. long, ovoid to oblong, slender, sessile, leafless or with small basal leaves, filaments glabrous; ♀ $\frac{1}{3}$–1 in. long, often elongate in fruit, globose to oblong, sessile or on short leafy peduncles; bracts spathulate or oblong-obovate, clasping the ovaries and reddish at first, then lax and blackening above, ciliate or pubescent over the back; ovaries short, conic to ovoid-conic, often laterally compressed, silkily pubescent or tomentose, more rarely glabrous, often rubescent in exposure; pedicels elongate, at length about 3 times as long as the short broad nectaries; styles usually short, but variable, sometimes long; stigmas variable, small or large, divided or entire, yellow or reddish.

One of the most variable of European willows; and several species were made of its variant forms by earlier salicologists. Smith describes *S. argentea*, *S. fœtida* (*S. ascendens*), and *S. prostrata*, besides adopting the Linnean species, *S. fusca*, *S. incubacea*, and *S. rosmarinifolia*, as species distinct from *S. repens*, under which later botanists placed them as varieties. It is difficult to keep up even as varieties forms such as these, which shade off into one another. *S. argentea* with its more upright growth, and silvery leaves, and frequent stipules, is one of the most distinct, but is connected by intermediate forms with the others. A more distinct position must be given to *S. rosmarinifolia* L., which is clearly a variety of *S. repens*.

Var. *rosmarinifolia* (L.).

Syn. *S. rosmarinifolia* L. Sp. Pl. 1020. Sm. Fl. Brit. 1062; Engl. Fl. iv. 214; in Rees Cycl. 109. B. White, Revision, 391. Garry in Journ. Bot. Suppl. 1904, 190.—*S. repens* L. var. *rosmarinifolia* Syme, E. B. viii. 248, tt. 1363, 1364 (var. *angustifolia*).—*S. Arbuscula* Sm. Fl. Brit. 1050; Engl. Fl. iv. 198.

Icon. E. Bot. tt. 1365, 1366 (var. *angustifolia*). Forbes, 86.

Exs. Hb. Smith, "*S. Arbuscula* Fl. Brit., Mr. Crowe's garden." Leefe, Sal. exs. No. 24. Hb. Borrer. Baenitz, Hb. Europ. No. 8651. E. F. & W. R. Linton, No. 72. Toepffer, Nos. 39, 142.

This variety is distinguished by the long linear leaves, which are ± pubescent at first, but soon become glabrous, and the small subglobose catkins.

There is a valuable discussion on the status of *S. rosmarinifolia* L. by B. White (*l. c.* 391), and a clear statement and elucidation of the ambiguity that has gathered round the name on the label of Toepffer's No. 39.

There is much doubt whether this form was ever a plant of

British origin. It is known only in gardens at the present time, and for a long while past.

S. repens is a plant of damp spots on heaths and commons, preferring peaty and sandy soils; rare, if not absent, on heavy soils; not very common on mountains, but ascending to 2500 ft. (or 2800 ft., *fide* B. White) in the Highlands; most abundant in damp hollows and flats among seaside sandhills, forming sometimes a dense carpet with its matted stems. Unrecorded for some few counties in Wales and the South of Scotland, otherwise almost universal throughout Great Britain; more local in Ireland, but recorded for all but six counties. Generally distributed through Northern and Central Europe and Asia, and extending southwards to N. Italy, Spain and Portugal.

S. repens × *Andersoniana* (p. 67).
× *aurita* (p. 46).
× *caprea* (p. 53).
× *cinerea* (p. 57).
× *herbacea* (p. 84).
× *lapponum* (p. 37).
× *phylicifolia* (p. 71).
× *purpurea* (p. 26).
× *viminalis* (p. 60).

SALIX REPENS × VIMINALIS.

Syn. *S. viminalis-repens* Lasch, Wimmer, Sal. Eur. 241; B. White, Revision, 391. Seemen, iv. 279.—*S. Friesiana* Anderss. Monogr. 121. — *S. repens* × *viminalis* E. S. Marshall & W. A. Shoolbred in Journ. Bot. 1898, 175.

Icon. Forbes, t. 87. Anderss. Monogr. t. vi. f. 66.

Exs. Leefe, Sal. exs. No. 19. Wimmer, Sal. Relict. (Herb. Sal. 144; Coll. Sal. 255, 256). Baenitz, Hb. Europ. (Schwerin, leg. A. Toepffer). E. F. & W. R. Linton, No. 98. Hb. E. S. Marshall, No. 1928.

Stems spreading or erect, 2–6 ft. high, branches slender, pubescent at first; buds oval to oval-oblong, pubescent. Stipules linear to lanceolate. Leaf-blades 2–3 in. long, oblong-lanceolate, more rarely linear-lanceolate, entire with the margins sometimes recurved; green and glabrescent above, pale green or more commonly silvery beneath with silky adpressed pubescence which is ± subpersistent. Catkins appearing before the leaves, in April; ♂ $\frac{3}{4}$ in. long, ovoid, very silky; ♀ 1–1$\frac{1}{4}$ in. long, ovoid-oblong to cylindric; bracts obovate (often broadly), silky, turning dark brown in the upper part; ovaries ovoid-conic, pubescent; pedicels 1–2 times as long as the linear-oblong nectaries; styles rather long, usually longer than the stigmas.

The description is based chiefly on specimens of several plants raised in the garden by design (Set No. 98); with the more silkily pubescent-leaved forms of these the plant discovered by E. S. Marshall in Sutherlandshire agrees well. In Europe, it occurs in Germany, and is reported from Lower Austria, Russia, and Scandinavia.

ix. PHYLICIFOLIÆ.

12. SALIX ANDERSONIANA Smith, E. Bot. t. 2343; in Rees Cycl. 123; Engl. Fl. iv. 223.

Syn. *S. nigricans* (♂ only) Sm. Fl. Brit. 1047; Engl. Fl. iv. 172; in Rees Cycl. 14. Seringe, Essai, 42. Doell, 504. Gren. & Godr. 138. Wimmer, Sal. Eur. 70. Anderss. DC. Prodr. xvi. (2), 240. Syme, E. B. viii. 242. Camus, Monogr. 194. Seemen, iv. 131.—*S. phylicifolia β* L. Sp. Pl. 1016.—*S. hirta*, ♂, Sm. Engl. Fl. iv. 221.—*S. Damascena* (Forbes) E. B. S. 2709.—*S. phylicifolia β nigricans* B. White, Revision, 396, 400. Linton in Journ. Bot. 1896, 462.

Icon. Hoffm. Hist. Sal. t. 18, t. 19, t. 24, f. 2. E. Bot. 1213, 1404, 2343; E. B. S. 2709, 2725. Forbes, 157. Syme, E. B. viii. tt. 1347, 1351–1354. Camus, Atlas, Pl. 18.

Exs. Hb. Smith, *S. hirta*, ♂, *S. Andersoniana*, ♀. Leefe, Sal. Brit. exs., Nos. 67, 68; Sal. exs., Nos. 13, 14, 50, 52, 53, 93, 95. Wimmer, Sal. Relict. (Herb. Sal. 100; Coll. Sal. 62, 66, 80). Magnier, Nos. 2063, 3590. Hb. B. White, Nos. 138, 156, 234, 241, 394, 413, 414. E. F. & W. R. Linton, Nos. 64, 65. Toepffer, Nos. 31, 136, 240. Enander, Nos. 101–104.

A variable shrub, 2–12 ft. in height, erect, or spreading or trailing on mountain rocks, bark dull grey-brown, young branches densely pilose or tomentose, slowly glabrescent; buds very pilose. Stipules frequent on strong shoots, often large, ½-cordate pointed, crenate-serrate to dentate; petioles rather long. Leaf-blades 1–3 in. long, oval-oblong, or lanceolate, or obovate-oblong, shortly acuminate or acute, serrate, or crenate-serrate, with serrations crowded to the tip; rather thin, not coriaceous, green, pubescent at first, then glabrescent above, paler green or glaucous usually shading into deeper green towards the tip, and ± pubescent beneath, sometimes becoming subglabrous except on the principal nerves; turning blackish in drying (at least while young). Catkins flowering in May, usually coeval with the leaves; ♂ ½–1 in. long, subsessile with 2–3 undeveloped leaves at the base, filaments pilose below; ♀ ½–1¼ in. long, lengthening to 2 or 3 in. in fruit, on leafy tomentose peduncles; pedicels 3 to 4 times as long as the quadrate or shortly oblong nectaries; ovaries usually glabrous (always, *fide* S. J. Enander), pubescent in some forms; styles long, stigmas commonly divided, large, almost as long as the styles.

The varieties which have been placed under *S. nigricans* (to use a little longer the customary designation), which were first described as species, but, shading as they do into one another, are now thought scarcely worth retaining as varieties, are mainly distinguished by variation in the shape of the leaf-blades and in the clothing of the ovaries.

In determining the status and position of the forms and varieties of *S. nigricans* (of which some sixty or more are said to have been described), it is necessary to define the characters which separate this species from *S. phylicifolia* L., the species to which it is most closely allied.

B. White (Revision, p. 396) says: "In *S. phylicifolia* the leaves are thicker and of a firmer texture, of a brighter and more shining green on the upper surface and often more glaucous below; whilst in *S. nigricans* they are thinner, less compact in substance, of a duller green and less shining above, and usually less brightly glaucous below. . . . *S. nigricans* has also a greater tendency to turn black in drying, but this is by no means invariable, &c." He adds that *S. phylicifolia* is less pubescent (sometimes glabrous), and soon glabrescent; and that the hairs are shorter and straighter, somewhat shining, and have some red-brown ones intermixed. In *S. nigricans* the hairs are more plentiful, softer, duller white, longer and less rigid. The young branches of the former are soon glabrous, and turn a shining brown; of the latter, more persistently pubescent and remaining dull.

In spite of these differences, Dr. B. White, influenced by the existence of many intermediate forms connecting the two, combined them as one species; and placed *S. nigricans* as a variety under *S. phylicifolia*, as Linnæus had previously left it.

Wimmer added another distinguishing character, affecting the ♂ flowers, describing the filaments of *S. nigricans* as pilose, and those of *S. phylicifolia* as glabrous. And regarding each as a true species, he placed some of the intermediate forms as hybrids, under the name *S. phylicifolia-nigricans*, which he afterwards altered to *S. nigricans-Weigeliana* (Denkschr. Schles. Ges. 168; Sal. Eur. 217).

S. J. Enander reduces the limits of the types of the two species still more, describing the leaves of *S. phylicifolia* as normally glabrous with the tip entire or free from serration, and the ovaries always pubescent; and *S. nigricans* as having the pubescent leaves serrate to the tip, and the ovaries always glabrous. All apparent forms of these two species, which confuse these characters and do not conform to their restricted type, are regarded by him as hybrids between the two (or between one of them and some other species).

There is much to be said for this drastic method of clearing up a difficult question (see the Introduction to Enander's Sal. Scand. exs. fasc. iii.).

The name which the species should bear now requires consideration. Linnæus, after describing his *S. phylicifolia*, separated some form of what has since been known as *S. nigricans* under the denomination of *S. phylicifolia β*. Smith took in hand what he thought to be this form, combining ♂ specimens from this country with ♀ specimens from Lapland for the purpose, and described this combination as *S. nigricans* (Engl. Fl. iv. 172). The name has very generally been accepted, in spite of obvious objections, arising to begin with from Smith's own account; first, the assumption that the ♂ British specimens were the same species and form as the ♀ specimens from Lapland (which was not the case); secondly, the distribution he assigns to *S. nigricans* in Britain (Engl. Fl. *l. c.*), "in fens, osier-grounds, woods, and thickets," which at once suggests some mistake; while the two localities given ("at Wrongay fen, Norfolk," and "near Shobden Court, Herefordshire," Engl. Fl. p. 173) are from counties which are not known to have produced any form of the species in question.

In his *Observandum*, at the beginning of his *Salices Scand.* fasc. iii., S. J. Enander has demonstrated that the name *S. nigricans* Sm. belongs only to the ♂ plant, of which one sheet is preserved in Smith's herbarium (Enander, *l. c.*, No. 101½); and argues that as Fries first detected the false basis on which Smith's *S. nigricans* ♀ rested, and worked out and described the true ♀ plant, the name should rightly be *S. nigricans* ♂ Smith atque ♀ Fries ex pte.

Another solution of the difficulty seems preferable to this complicated nomenclature. In Smith's herbarium the typical ♀ of this species is well represented by specimens of *S. Andersoniana* Sm.; and if the name *S. nigricans* Sm. be rightly discarded (as *nomen confusum*), the name *S. Andersoniana* Sm. (E. Bot. t. 2343; Engl. Fl. iv. 223) is well qualified, by drawings, description, and specimens, to take its place.

Of the forms which, formerly described as species, have been placed as varieties under *S. nigricans* by Syme, Babington, and others, var. *Damascena* (Forbes) with broadly ovate leaf-blades green on both sides, var. *petræa* (G. Anders.) with narrow oblong or oblong-lanceolate leaf-blades, and var. *hirta* (Sm.) with the blades oval-oblong, are synonymous with *S. Andersoniana*. Vars. *cotinifolia* (Sm.), *Forsteriana* (Sm.), and *rupestris* (Sm.), having pubescent ovaries and rather rigid leaf-blades which are not uniformly blackened when dried, are transferred to *S. nigricans* × *phylicifolia*. Var. *tenuifolia* (Sm.) is in the main another hybrid; Borrer detected the identity of the Kirby Lonsdale plant, on which it was partly founded, with *S. laurina* Sm., i. e. *S. cinerea* × *phylicifolia* (see Journ. Bot. Suppl. 1904, p. 187); and a specimen of this Kirby Lonsdale plant in hb. Smith confirms the identification.

S. Andersoniana Sm., hitherto known commonly as *S. nigricans* Sm., usually a subalpine shrub but descending to near sea-level in the North of Scotland, is widely distributed from the Orkneys southwards to Lancashire and Yorkshire, and also occurs in Warwickshire. Smith's records from Herefordshire and Norfolk have not been confirmed. It ascends to 2500 ft. in the Highlands, where it is not unfrequent as a dwarf trailing under-shrub on moist mountain rocks. Recorded from Donegal, Antrim, and Londonderry, but not seen for many years; Westmeath (planted). Mountain regions of Central and Southern Europe, Scandinavia, Russia; Syria, W. Siberia, and Kamschatka, in Asia.

S. Andersoniana × *arbuscula* (p. 64).
× *arbuscula* × *phylicifolia* (p. 64).
× *aurita* (p. 45).
× *aurita* × *cinerea* (p. 42).
× *aurita* × *myrsinites* (p. 44).
× *aurita* × *phylicifolia* (p. 45).
× *caprea* (p. 52).

S. *Andersoniana* × *cinerea* (p. 55).
× *cinerea* × *phylicifolia* (p. 56).
× *herbacea ?* (p. 65).
× *myrsinites* (p. 65).
× *myrsinites* × *phylicifolia* (p. 66).
× *phylicifolia* (p. 66).
× *repens* (p. 67).
× *reticulata ?* (p. 68).

SALIX ANDERSONIANA × ARBUSCULA.

Syn. S. *nigricans* × *arbuscula* Seemen, iv. 235 (excluding S. *Kraettliana* Brügger).

Exs. E. F. & W. R. Linton, Nos. 65 ?, 97, pr. pte. (*i.e.* No. 101, excluding No. 111, which is doubtful, and may be S. *Andersoniana* × *phylicifolia*). Hb. E. F. Linton, Nos. 101 (supra), 137 (?), 139.

A dwarf shrub, with branches and buds pubescent at first. Stipules 0, or minute on strong shoots. Leaf-blades ¾–1¼ in. long, broadly or narrowly oval, or oval-oblong, narrowed to both ends, serrate or crenate-serrate, pubescent at the very first, usually soon glabrous, ± shining and sometimes reticulate above, glaucous or dull green beneath, blackening somewhat when drying. Catkins ½–1½ in. long, appearing with the leaves, only ♀ observed; bracts narrowly oblong acuminate or subobtuse, pubescent, ± brown towards the tip; ovaries ovate-conic rather small, silvery pubescent, or, in another form, lanceolate, glabrous below, thinly pubescent in the upper half; pedicels variable, 1–3 times as long as the oblong nectaries, style rather short or long.

This hybrid is not easy to recognize with certainty. Our plants show signs of S. *arbuscula* in the small size and glabrescence of the leaf-blades, their shining and ± reticulate upper surface, in the suppression of the stipules, in the small ovaries, pale or light brown colour of the bracts, and narrow oblong nectaries.

S. J. Enander admitted that S. *arbuscula* is present in Nos. 101 and 139, but was of opinion that S. *phylicifolia* had a share in the composition of both, as well as in the specimens of the triple hybrid following.

It is very doubtful if S. *arbuscula* × *nigricans* has been dectected elsewhere, though it has been reported by Floderus for Scandinavia. Our plants have been found only in the Breadalbane Hills, Perthshire, *viz.* on Ben Lawers, and on the rocks above Lochan na Lairige low down on Meall nan Tarmachan, more than once in each locality.

SALIX ANDERSONIANA × ARBUSCULA × PHYLICIFOLIA.

This is with difficulty distinguished from S. *Andersoniana* × *arbuscula*. The chief difference lies in the leaf-blades, which are less blackened in drying and have the tip entire or subentire, as in S. *phylicifolia*.

This triple hybrid has been obtained from Meall Taurnie, Sgiath Chrom, and the lower rocks of Meall nan Tarmachan above Lochan na Lairige, all in the Breadalbane Hills, in the neighbourhood of Killin, Perthshire, and was discovered by P. Ewing. Not known elsewhere.

SALIX ANDERSONIANA × HERBACEA?

Syn. *S. semireticulata* B. White, pro pte., Revision, 444.

Exs. Hb. B. White, No. 402. E. F. & W. R. Linton, No. 107?

A dwarf trailing shrub, much resembling some forms of *S. herbacea* × *lapponum*, but with the leaf-blades more serrate (the teeth with small cartilaginous points) and inclined to blacken in drying, and the pedicels of the ovaries in an early stage as long as, and at length exceeding, the linear or linear-oblong nectaries, the lower ones sometimes twice as long or more.

Dr. B. White's No. 402 is minutely described by him (*l. c.* pp. 444–445); the specimens show even longer pedicels than he describes, an important character favouring the *S. Andersoniana* parentage. This plant is described under B. White's name, p. 68.

The other plant, Linton, No. 107, is somewhat similar, but has the leaf-blades more regularly serrate, the bracts rather more broadly obovate, and the well-developed pedicels 2–3 times as long as the linear-oblong nectaries. The pedicels and oblong shape of the nectaries seem to show that this is not *S. herbacea* × *lapponum*, the only alternative.

The latter plant is from Glen Fiagh, Forfarshire; the former from Meall Ghaordie, Perthshire. This hybrid is endemic to Scotland.

SALIX ANDERSONIANA × MYRSINITES.

Syn. *S. punctata* Wahlenberg, Fl. Lapp. 269 (1812).—*S. myrsinitoides* (Fr.) Anderss. DC. Prodr. xvi. (2), 290.—*S. myrsinites-nigricans* Wimmer, Sal. Eur. 227.—*S. Wahlenbergii* Anderss. in Blytt Norges Fl. pt. ii. 473 (1874). B. White, Revision, 433.—*S. nigricans* × *myrsinites* Seemen, iv. 239.

Icon. Enander, Nos. 64, 71, 72½.

Exs. Leefe, Sal. exs. 1, 14 (*S. damascena*). Hb. B. White (from Meall Ghaordie, and from Barvic Burn, near Crieff, as *S. nigricans*). E. F. & W. R. Linton, Nos. 24, 74, 102. Enander, Nos. 62, 63, 65–70, 72, 73–79. Hb. W. R. Linton, Nos. 69, 92, 96.

A variable hybrid, in foliage and catkins; usually a dwarf shrub. *S. Andersoniana* is shown in the greater pubescence and duller colouring and blackening in dried specimens of the foliage; in the broader and more foliaceous stipules; in the partial or total glabrescence of the ovaries, and in the longer pedicels. The influence of *S. myrsinites* appears in the leaf-blades being ± glossy on the upper surface, and not blackening much, the lower ones being usually green and ± shining beneath, their nerves often opaque and their reticulation marked; the stipules, too, being green beneath and showing some lustre. In the catkins the anthers are tipped with red or crimson, the ovaries ± pubescent, the styles tinged with red-purple, owing to the same influence of *S. myrsinites*.

S. Andersoniana × *myrsinites* is usually a dwarf shrub trailing over damp rocks, rather frequent in Glen Fiagh, found also in Glen Doll, Forfarshire; in Perthshire it occurs on Ben Laoigh, Meall Ghaordie, Craig Mhor (head of Glen Lochay), and on the lower rocks of Meall nan Tarmachan above Lochan na Lairige;

Argyll, Meall nan Tigearn; Aberdeenshire, Little Craigindal. Europe: Switzerland, Tirol, Norway, Sweden, Lapland.

SALIX ANDERSONIANA × MYRSINITES × PHYLICIFOLIA.

Syn. *S. nigricans* × *phylicifolia* × *myrsinites* Seemen, iv. 240.

Exs. E. F. & W. R. Linton, No. 73 (*S. myrsinites* forma). Enander, Nos. 80–82. Hb. E. F. Linton, Nos. 135, 181 (4, 5).

This resembles *S. Andersoniana* × *myrsinites*, but the leaf-blades are of a brighter green, green and not glaucous beneath, and not blackening much when dried, of firmer texture, much sooner glabrescent, the ovaries are more densely pubescent usually (as in No. 135), but may be less so (No. 181 (4)).

This triple hybrid has been found by W. R. Linton or myself on Meall Ghaordie, Perthshire (No. 135), in Glen Fiagh, Forfarshire (Linton exs. No. 73), and in Glen Callater, Aberdeenshire. No. 181 consists of a series raised from seed in the garden. S. J. Enander has given me much assistance in naming these plants. Europe: Prov. Herjedalen, Sweden.

SALIX ANDERSONIANA × PHYLICIFOLIA.

Syn. *S. nigricans* × *phylicifolia* Linton in Journ. Bot. 1892, 362. Seemen, iv. 234.—*S. phylicifolia-nigricans* Wimmer in Denkschr. Schles. Ges. 168. B. White, Revision, 400. Linton in Journ. Bot. 1896, 462.—*S. nigricans-Weigeliana* Wimmer, Sal. Eur. 217.—*S. Borreriana*, ♀, Sm. Engl. Fl. iv. 174.—*S. cotinifolia* Sm. Fl. Brit. 1066; Engl. Fl. iv. 220.—*S. Forsteriana* Sm. Engl. Fl. iv. 224.—*S. rupestris* Sm. Engl. Fl. iv. 222.—*S. tetrapla* Walker, Essay, 408. Sm. Engl. Fl. iv. 177.—*S. nitens* (G. Anders.) Sm. Engl. Fl. iv. 175.

Icon. E. Bot. tt. 1403, 2342 (*S. rupestris*), 2344 (*S. Forsteriana*). E. B. S. tt. 2619, 2655 (*S. nitens*), 2702 (*S. tetrapla*), 2729 (*S. propinqua*), 2749 (*S. laxiflora*). Syme, E. B. viii. tt. 1337, 1341–1345, 1348–1350.

Exs. Hb. Smith (*S. cotinifolia*). Leefe, Sal. Brit. exs. No. 8 (*S. Croweana*, ♀, monstrous with double ovaries), 72; Sal. exs. Nos. 8 (*S. tetrapla*), 85. Wimmer, Sal. Relict. (Herb. Sal. No. 109; Coll. Sal. Nos. 69, 72, 75, 78). Hb. B. White, Nos. 186, 210, 299, 388. E. F. & W. R. Linton, Nos. 20 (*S. nigricans*), 21, 42, 43, 59, 66. Enander, fasc. iii. Nos. 105–115.

A protean hybrid, of which several forms have been described as species; consequently difficult to define. The evidence of *S. Andersoniana* may be seen in the less polished bark of the 1–2-year old branches, their pubescence while young, the blackening of the ± pubescent leaf-blades and their apical serration, the more frequent presence of foliaceous stipules, and the reduced or partial pubescence of the ovaries.

The influence of *S. phylicifolia* appears in the presence of some polish on the bark of the 1–2-year old branches, and their rapid glabrescence; in the modified blackening of the foliage when dried and its quicker glabrescence, the subentire tip of the blade, the reduced stipules, and the ovaries being partially or altogether pubescent.

The influence of each species varies so much and so unequally in regard to these characters that no further description of the hybrid is attempted.

Rather frequent in the northern counties of England and throughout Scotland, wherever the two species occur together. In Europe, native in Scandinavia and Finland; found in Germany and Austria chiefly in botanic gardens, according to O. von Seemen.

Salix Andersoniana × repens.

Syn. *S. nigricans-repens* Heidenreich in Anderss. Monogr. i. 131. Wimmer, Sal. Eur. 239. B. White, Revision, 394?—*S. nigricans* × *repens* Seemen, iv. 256.

Exs. Hb. B. White (Cat. Perthshire Museum, p. 22)?

B. White (*l. c.*) describes specimens from two localities in Perthshire as this hybrid, and says they "evidently belong to a hybrid between *S. repens* and *S. nigricans*. The specimens appear to me to have only a superficial likeness to the hybrid, to want any clear evidence of *S. repens*, and to be a small-featured form of *S. Andersoniana* × *phylicifolia*.

A plant found by the Lochy Burn, Glen Shee, also in Perthshire, by the Rev. E. S. Marshall (No. 704, sponte non cult.) in 1892, and again by W. R. Linton and myself (No. 259) in 1894, merits notice here as probably combining these two species (with another?). It was named by S. J. Enander *S. aurita* × *nigricans* × *repens ?* on specimens of both gatherings submitted to him; to me it seemed rather to be *S. lapponum* × *nigricans* × *repens*. To both of us it appeared to be Heidenreich's hybrid with the addition of a third element. A description of it follows.

A dwarf shrub, 1–2 ft. high, decumbent or ascending, with tomentose young shoots, branches glabrous by winter, dull grey-brown somewhat polished here and there; buds oval at length glabrescent. Stipules almost suppressed, ovate when rarely produced. Leaf-blades ½–2 in. long, oval-oblong, rarely broader above the middle, acuminate, usually with a straight tip, narrowed to the base, finely serrate with close or more distant teeth, becoming dull green and glabrescent above, more persistently grey-pubescent beneath (except the narrow basal leaves, which are rather numerous). Catkins ♀ coeval with the leaves, fl. May–June, about 1 in. long, elongate in fruit, with few small basal leaves very silky at first; bracts oblong-spathulate clothed with long silky hairs upwards; pedicels woolly-pubescent, lower ones 2–3 times as long as the linear-oblong nectaries; ovaries narrow long-conic, pubescent in the upper half, glabrous in the lower; styles long, stigmas broad rather short, undivided.

In this plant *S. Andersoniana* appears in the pubescence and modified blackening of the foliage and the glabrescence of the lower part of the ovaries; *S. repens* in the habit of the plant, the shape and size of the leaves and their occasional sparse serration, and the many narrow basal ones; *S. lapponum* (if present) in the impressed nerves of some of the leaf-blades, the rather long narrow nectaries, and some polish on the 1-year old branches.

This form is from Perthshire. The *S. nigricans-repens* of Heidenreich is from Tilsit, Prussia, and appears rightly named.

The plant issued by Baenitz (from Innsbruck, Tirol) under this name seems to me merely *S. nigricans* ♀, i. e. *S. Andersoniana.*

[SALIX ANDERSONIANA × RETICULATA.

Syn. × *S. semireticulata* (*S. reticulata* × *nigricans ?*) B. White, Revision, 444. Quoted by Seemen, iv. 327.

Exs. Hb. B. White, No. 402; with which is associated No. 403, and from Hb. Smith, "*Salix elliptica*, nov. sp., Clova Mountains, Mr. Thomas Drummond, Mr. W. Robertson, 1825."

Branches slender, trailing, very pubescent, at length glabrous dark brown shining, buds ovate pubescent, becoming glabrous. Stipules rarely formed, roundish-ovate. Leaf-blades ½–1 in. long, 3–4 times as long as the woolly petiole, broadly or roundly oblong, obtuse, truncate or subcordate at the base, slightly crenate-serrate to entire, ± hairy at first, dark green, glabrescent above and nearly so beneath, margins slightly reflexed, veins impressed above, reticulate and somewhat raised beneath. Catkins on 3–4-leaved peduncles as long as the catkins, short, ovate, close-flowered; bracts broadly spathulate, rounded above, clothed with long white hairs, reddish below the blackened tip; ovaries subulate-conic, pubescent above, glabrous or glabrescent in the lower half; pedicels silky, equal to or shorter than the linear-oblong nectaries; stigmas bifid, yellow, as long as the moderate styles.

This description is based on the specimens of No. 402 and the description of the plant by B. White (*l.c.* p. 444). The plant appears to be a hybrid between two species with a glabrous and a pubescent ovary, and in some respects to have affinity with *S. herbacea* rather than with *S. reticulata* (see p. 65). On a minute catkin specimen supplied me by B. White, S. J. Enander commented in 1909, "*S. herbacea* × *reticulata* mihi videtur."

Nos. 402, 403 were gathered on Meall Ghaordie, Perthshire.

Dr. B. White associates with them a plant in Smith's herbarium labelled "*Salix elliptica*, nov. sp., Clova Mountains, Mr. Thos. Drummond, Mr. W. Robertson, 1825"; with a pencil note, "I have this as a rounder-leaved var. of *S. myrsinites*." This plant, however, has nothing to do with *S. myrsinites*, nor with *S. reticulata*. It is *S. herbacea* × *lapponum*.

On the whole, the evidence for retaining *S. Andersoniana* × *reticulata* in the list is not satisfactory.]

13. SALIX PHYLICIFOLIA L. Sp. Pl. 1016. Sm. Fl. Brit. 1049, 1053; Engl. Fl. iv. 170; in Rees Cycl. 15. Anderss. Monogr. 131; DC. Prodr. xvi. (2), 241. Syme, E. B. viii. 237. B. White, Revision, 396. Camus, Monogr. 189. Seemen, iv. 140.—*S. bicolor* Ehrh. Beitr. v. 162 (1790). — *S. Croweana* Sm. Fl. Brit. 1043; Engl. Fl. iv. 193 (pr. pte.).—*S. radicans* Sm. Fl. Brit. 1053.—*S. Weigeliana* Willd. Sp. Pl. iv. 2678 (1806). Wimmer, Sal. Eur. 76.—*S. Borreriana* ♂ Sm. Engl. Fl. iv. 174.—*S. Davalliana* Sm. Engl. Fl. iv. 175. — *S. tenuior* Borrer, E. B. S. 2650 (saltem pr. pte.). Syme, E. B. viii. 239.

Icon. E. Bot. 1390 (*S. Dicksoniana*)?, 1598. E. B. S. 2656, 2660, 2701. Forbes, Sal. Wob. tt. 38, 44, 46, 47. Fl. Dan. 1052. Syme, E. B. viii. tt. 1335–36, 1340, 1345. Camus, Atlas, Pl. 19. Enander, Sal. Scand. iii. Nos. $118\frac{1}{2}$, $120\ \frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$.

Exs. Hb. Linn. Nos. 10 (2, 3), 23, 25, 81, 89. Hb. Smith (*S. radicans*). Leefe, Sal. Brit. exs. Nos. 74, 76–78, 83, 84; Sal. exs. 26 (*S. Borreriana* ♂), 39 (*S. tenuior*), 42, 64, 68 (*S. tenuifolia*). Wimmer, Sal. Relict. (Herb. Sal. 4; Coll. Sal. 86, 87). Hb. B. White, No. 401. E. F. & W. R. Linton, Nos. 40, 41. Toepffer, Nos. 12, 207, 208. S. J. Enander, Nos. 116–120.

A shrub with stems 2–12 ft. high, branching from the base, branches glabrous or often slightly pubescent at first in Britain, at length dark brown and polished; buds narrow, pointed, yellowish, glabrous or quickly glabrescent. Stipules infrequent, small, cordate-acuminate when well developed. Leaf-blades 1–3 in. long, oval, oblong-acuminate, or oblong-obovate to -lanceolate, ± acute, serrate or crenate-serrate (teeth not crowded), subentire near the base and at the tip, green and shining above, glaucous or grey-green beneath (often green near the tip), glabrous theoretically but often somewhat pubescent at the very first in Britain, firm and becoming coriaceous, not blackening when dried. Catkins usually subsessile with few small basal leaves, preceding the foliage; bracts oblong to obovate, acute or subacute, ± hairy; ♂ 1 in. long, filaments glabrous, anthers yellow; ♀ $1–2\frac{1}{2}$ in. long, elongate, at length lax, peduncles pubescent; ovaries pubescent to tomentose (rarely glabrous); pedicels pubescent elongate, at length 3–4 times as long as the quadrate or shortly oblong nectaries; styles long, usually longer than the large stigmas.

The varieties of *S. phylicifolia* in Syme E. B. and former editions of the *London Catalogue* were described as species by Sir J. E. Smith and others, but have latterly been reduced to mere synonyms of *S. phylicifolia* or its hybrid with *S. Andersoniana*, since it has come to be recognized how variable these two species are, and how numerous are the variations of the hybrid between them.

Since *S. phylicifolia* has normally pubescent ovaries, glabrous filaments, and a leaf with an entire tip, the following are best regarded as synonyms, forms which vary only in the shape of the leaf-blade:—*S. radicans* Sm., *S. Davalliana*, and *S. tenuior* Borrer, with blades oblong-acuminate or obovate-acuminate to oblanceolate; *S. Weigeliana* Willd., and *S. Croweana* Sm. (pr. pte.), having leaf-blades which are broadly or narrowly oval, and rather subacute than acuminate; of these *S. Croweana* has its filaments connate near the base. Of the forms described with glabrous ovaries, *S. phillyreifolia* Borrer seems to be true *S. phylicifolia*; so does *S. Borreriana* Sm. ♂; but the ♀ plant of the latter and *S. tenuifolia* Sm. ♂ and ♀ for the most part are *S. Andersoniana* × *phylicifolia*, except the Kirby Lonsdale plant, which Borrer saw was a form of "*S. bicolor* of Hooker's Brit. Flora," i. e. *S. laurina* Sm. (see Journ. Bot. 1904, Suppl. pp. 185, 187); and this is what the specimen in hb. Smith appears to be. Leefe's No. 68, "received from Borrer as *S. tenuifolia*," differs from

Borrer's plate and description in having pubescent ovaries, and is rather typical *S. phylicifolia.*

Three more of these named forms have the ovaries glabrous below but pubescent in the upper half, a condition which indicates descent from species with glabrous and species with pubescent ovaries. These are *S. laxiflora* (G. Anders.) Borrer, E. B. S. No. 2749, with obovate blades, *S. propinqua* Borrer, E. B. S., No. 2729, with oval-oblong blades narrowed to both ends, and *S. tetrapla* (Walker) Sm. Engl. Fl. iv. 177, with narrow obovate-lanceolate blades; all of which are best placed among the hybrids of *S. Andersoniana* and *S. phylicifolia.*

The status of *S. Dicksoniana* Sm. has long been a problem. B. White suggested *S. arbuscula* × *phylicifolia* as a likely solution (*l. c.* 399, 412). Smith himself connected it with *S. arbuscula* by its catkins; but his *S. arbuscula* was a *S. repens rosmarinifolia* form. It is possible that the sheet in Smith's herbarium may solve the problem. This sheet labelled "Mr. Crowe's garden—plant sent by Mr. Dickson—*S. myrtilloides* Fl. Brit."—then later "*S. Dicksoniana* Engl. Bot. t. 1390," contains four foliage specimens and one of April catkins. The foliage is *S. phylicifolia,* with no suggestion of *S. arbuscula* in it and not much of *S. repens,* if any. The flowering specimen is a *S. repens rosmarinifolia* form! Is it possible that Smith, not suspecting any mistake or mixture of specimens on Crowe's part, accepted the catkins and foliage, said to be taken from the "plant sent by Mr. Dickson," as one species, which he named *S. Dicksoniana* in honour of its finder? and that the *S. phylicifolia* plant was passed on through Borrer (Leefe, Sal. exs. i. 12) as the plant of Smith? The catkins in Leefe's specimens are not much different from *S. phylicifolia* type, and bear no resemblance to a *S. repens rosmarinifolia* form.

S. phylicifolia is found in similar situations to *S. Andersoniana,* from West Yorkshire and North Lancashire northwards to the Orkneys. Usually in hilly or mountainous regions, it is found at quite low levels in the North of Scotland, and ascends to 2200 ft. in the Highlands, but is not common on mountain rocks. In Ireland it was formerly known from Mayo to Donegal, Londonderry, and Antrim; seen in 1885 on Ben Bulben, near Sligo, and in Westmeath (planted). Mountain regions of Central Europe, Scandinavia, Russia; in Asia, Siberia, Kamschatka, N. China.

S. phylicifolia × *Andersoniana* (p. 66).
× *Andersoniana* × *aurita* (p. 45).
× *Andersoniana* × *cinerea* (p. 56).
× *arbuscula* (p. 74).
× *aurita* (p. 45).
× *aurita* × *cinerea* (p. 42).
× *aurita* × *purpurea* (p. 24).
× *caprea* (p. 52).
× *caprea* × *cinerea ?* (p. 49).
× *cinerea* (p. 56).
× *herbacea* (p. 83).
× *lapponum* (p. 37).

S. phylicifolia × *myrsinites* (p. 78).
× *purpurea* (p. 26).
× *repens* (p. 71).

SALIX PHYLICIFOLIA × REPENS.

Syn. *S. repens* × *phylicifolia* Anderss. Monogr. i. 156. Seemen, iv. 257.—*S. Schraderiana* Willd. Sp. Pl. iv. 695 (1805). B. White, Revision, 399.

Exs. Hb. W. R. Linton, No. 320 (excluding E. F. & W. R. Linton, No. 95, which is probably *S. Andersoniana* × *phylicifolia*).

A small shrub with spreading branches pubescent at first but soon glabrous. Stipules not seen. Leaf-blades 1–2¼ in. long, lanceolate to oblong-lanceolate, distantly serrate, soon glabrous (the early narrow blades only retaining a few silky hairs), glaucous-green beneath. Catkins ♀ 1–2 in. long, appearing rather before the leaves, in May or June, becoming lax in fruit; bracts oblong-obovate obtuse, thinly hairy; pedicels 3 times as long as the short nectaries; ovaries ovate-subulate, glabrous below pubescent upwards; styles long, stigmas shorter.

The plant described (No. 320, hb. W. R. Linton) is from Glen Shee, Perthshire. Reported by Seemen (*l. c.*) to be known only in botanical gardens, in Germany, Austria, and Switzerland. The plants, however, grown in the Garden at Munich, and issued by Ad. Toepffer, are now withdrawn as *S. aurita* × *phylicifolia*, and appear to have no connection with *S. repens*.

X. ARBUSCULÆ.

14. SALIX ARBUSCULA L. Sp. Pl. 1018. Anderss. Monogr. 145; DC. Prodr. xvi. (2), 247. Wimmer, Sal. Eur. 102. Syme, E. B. viii. 254. B. White, Revision, 410. Camus, Monogr. 123. Seemen, iv. 148.

Syn. *S. prunifolia* Sm. Fl. Brit. 1054; Engl. Fl. iv. 193; in Rees Cycl. 55. Seringe, Essai, 49.—*S. carinata* Sm. Fl. Brit. 1055; in Rees Cycl. 63; Engl. Fl. iv. 197.—*S. vacciniifolia* Sm. in Rees Cycl. 56; Engl. Fl. iv. 194.—*S. venulosa* Sm. Fl. Brit. 1055; in Rees Cycl. 57; Engl. Fl. iv. 195.

Icon. E. Bot. tt. 1361, 1362, 1363, 2341. Forbes, tt. 57–59, 138. Anderss. Monogr. vii. fig. 80. Syme, E. B. viii. tt. 1371–1374. Camus, Atlas, pl. 9, E–I.

Exs. Hb. Linn. No. 31. Hb. Smith (*S. prunifolia*, *S. carinata*, *S. vacciniifolia*, *S. venulosa*). Leefe, Sal. exs. i. 11 ("*S. fusca* L. Hook. Br. Fl. p. 361, var. *parvifolia*," cult. specimens of *S. arbuscula* ♀), 24; ii. 47 (*S. venulosa*). Hb. Edinb. (*S. prunifolia*, Clova; also "Clova Mountains, Drummond, 1824"). Billot, 1962. Wimmer, Sal. Relict. (Coll. Sal. No. 118). Hb. B. White, Nos. 253, 300, 305–307, 315, 463–465. E. F. & W. R. Linton, No. 22. Toepffer, Nos. 52, 202 (f. *bicapsularis*), 203 (var. *erecta* Anderss.).

A dwarf shrub, much branched, with stems 1–2 ft. long, ascending, or trailing on rocks, branches often slightly pubescent when very young, dark brown polished when 1–2 years old; buds ovoid pointed, glabrous or soon glabrescent. Stipules 0 or small, ovate on strong branches. Leaf-blades ¼–1½ in. long, broadly or narrowly ovate or oval-oblong, more rarely subrotund or narrowly ovate-lanceolate, acute obtuse or even rounded at the tip, usually finely serrate, sometimes subcrenate, shining green and usually glabrous above, glaucous and somewhat pubescent beneath. Catkins about 1 in. long, slender, pale, coeval with or before the leaves, on leafy peduncles, fl. May–June; bracts spathulate or oblong-obovate, clasping the base of the ovaries, pubescent, pale at first becoming brown at the tip: ♂ with glabrous filaments, anthers red or reddish at first; ♀ elongate (to 1½ in.); ovaries $\frac{1}{6}$–¼ in. long, ovate-conic to ovate-lanceolate tomentose, mostly subsessile but lower ones pedicelled; pedicels usually much shorter than the linear or lingulate nectaries; styles varying from very short to moderately long, sometimes ± bifid, stigmas small.

A very variable plant, especially in its leaves, on variations in which Smith (whose *S. arbuscula* was a *S. repens rosmarinifolia* form) founded four species, which were long ago reduced to mere varieties; viz. *S. carinata*, a larger more erect form, with ovate leaf-blades folded into a keel and recurved, inconspicuously veined, glaucous-green beneath; *S. prunifolia*, with leaf-blades ovate, glabrous, flat, glaucous beneath, reticulate above with raised veins when dry; *S. vacciniifolia*, with leaf-blades ovate-lanceolate, glaucous and silky beneath, stem decumbent; and *S. venulosa*, with leaf-blades ovate, glabrous, reticulate above with prominent veins, rather glaucous beneath. There are, however, no very definite characters in the leaves, and none in the catkins, to separate these forms.

S. arbuscula, a willow of rocky ledges on Scotch mountains, is found at 1500 ft. and upwards in Argyllshire, abundantly in the Breadalbane range, Perthshire, from 2000–2700 ft., and was formerly found in the Clova Mountains, Forfarshire. It has been reported also from Dumfries-shire, S. Aberdeen, and the Orkneys, but without satisfactory evidence. Europe: Mountain ranges of Central Europe, Scandinavia; Siberia.

S. arbuscula × *Andersoniana* (p. 64).
× *Andersoniana* × *phylicifolia* (p. 64).
× *herbacea* (p. 72).
× *lapponum* (p. 73).
× *myrsinites* (p. 73).
× *phylicifolia* (p. 74).

SALIX ARBUSCULA × HERBACEA.

Syn. *S. simulatrix* B. White, Revision, 439.—*S. arbuscula* × *herbacea* Enander, Sal. Scand. exs. fasc. i. No. 23 (letterpress).

Icon. Enander (*l. c.*).

Exs. Hb. B. White (Coire Dubh Galair; Meall Dhuin Croisg, ♀ only, not ♂ cult.). E. F. & W. R. Linton, Nos. 67, 96. Hb. E. S. Marshall, Nos. 48, 69. Enander, No. 24.

A dwarf creeping shrub, stems mostly buried in moss, branches slender, ascending, slightly pubescent at first or glabrous. No stipules seen. Leaf-blades ½–1 in. long, obovate or broadly oval, subacute or rounded (rarely slightly retuse) at the tip, rounded or subcordate at the base, finely serrate; glabrous (earliest with long silky hairs beneath), green, reticulate when dry with nerves raised often on both sides. Catkins ½–¾ in. long, slender, ovoid then cylindric; bracts shortly or roundly obovate ± silky; filaments glabrous; ovaries small subsessile, or at length lower shortly pedicelled, ovoid or ovoid-conic grey pubescent; nectaries single, linear, exceeding the pubescent pedicel; styles rather short, about as long as the stigmas.

A form found by E. S. Marshall (No. 1175) in Argyll differs in having broader more coriaceous leaves, glaucous-green beneath, and in being more glabrous from the first.

The description above is drawn from ♂ specimens gathered in Coire Ardran and ♀ specimens from Meall na Saone, both localities in Perthshire. A plant from the latter mountain S. J. Enander suspects to be *S. arbuscula* × *herbacea* × *lapponum*. Europe: Norway at Kongswold, and Switzerland.

SALIX ARBUSCULA × LAPPONUM.

Syn. *S. spuria* (*S. lapponum* × *arbuscula*) B. White, Revision, 430 (non Willd.).—*S. arbuscula* × *lapponum* Seemen, iv. 285. Floderus, Bihang K. Sv. Vet.-Akad. Handl. xvii. pt. 3, n. 1, 39 (1891), and Arkiv för Bot. viii. n. 9, p. 5 (1909).

Exs. Hb. B. White, No. 304. E. F. & W. R. Linton, No. 46. Hb. E. F. Linton, Nos. 125, 134, 150. Hb. W. R. Linton, No. 242.

A dwarf shrub, 1–2 ft. high, erect or ascending; branches and buds pubescent at first, sooner or later glabrous. Stipules 0. Leaf-blades ¾–1¾ in. long, oval, oval- or ovate-oblong, or oblong-lanceolate, acute or acuminate, serrate, crenate or subentire, ± softly pubescent at first, green and sooner or later glabrescent above with the veins often impressed, grey-green or glaucous or sometimes green, glabrescent or not, beneath. Catkins ½–1 in. long, cylindric, coeval with the leaves; ♂ small, anthers reddish at first; ♀ elongate to 1½ in. close-flowered; bracts obovate-oblong obtuse or rounded, more rarely ovate subacute, turning dark brown in the upper part, silky; ovaries ovoid-conic, tomentose, sessile or the lower ones shortly pedicelled; nectaries linear long, sometimes exceeded by the lowest pedicels; styles usually long, stigmas small.

S. spuria (Schleich.) Willd., which is *S. arbuscula* × *helvetica*, has been often quoted as a synonym of *S. arbuscula* × *lapponum*, in error. Since we have no proof of *S. helvetica* being a British plant, we have no claim to *S. spuria* as native.

S. arbuscula × *lapponum* has been found on the northern slopes of Ben Lawers, Meall Garbh, Meall Ghaordie, and Meall na Saone, and on other hills, near Killin, all in the Breadalbane range, Perthshire; and Canlochan Glen, Forfarshire. Europe: Scandinavia.

[SALIX ARBUSCULA × MYRSINITES.

Syn. *S. serta* B. White, Revision, 436? Seemen, iv. 240.

Exs. Hb. Boswell-Syme ("*Salix arbuscula.* Breadalbane

Mts., Lyon"? "*Salix prunifolia.* Breadalbane Mts. J. D. Hooker")?

It is very doubtful if any of the British specimens which have been referred to this hybrid have been rightly interpreted. The descriptions given by B. White (*l. c.*) seem to exclude the presence of *S. myrsinites* in any of the specimens discussed.

An attempt to cross *S. arbuscula* and *S. myrsinites* in the garden failed to produce any seed.

The hybrid has been recorded for Scandinavia by Floderus, and for Switzerland by Seemen.]

SALIX ARBUSCULA × PHYLICIFOLIA.

[*Syn. S. Dicksoniana* (Sm.) B. White, Revision, 412, excluded; also reference in Seemen, iv. 235. Linton in Journ. Bot. 1896, 468.]

Exs. Hb. E. S. Marshall, Nos. 1169, 2117*a*.

Very like *S. Andersoniana* × *arbuscula*, but with leaf-blades more acuminate, with the tip free from serrations, glabrous almost from the very first, as are the young twigs. In the catkins (fl. May, June) the ovaries are loosely tomentose, subsessile; bracts narrow oblong, pale nearly two-thirds of their length below the dark subobtuse tip, thinly pubescent; nectaries slender linear-oblong, as long as the pedicels, at length half as long; styles medium long, stigmas small.

Found by E. S. Marshall on Ben Chasteil, Argyllshire, 1893. Not known elsewhere; endemic in Scotland.

xi. NIVEÆ.

15. SALIX LANATA L. Sp. Pl. 1019. Sm. Engl. Fl. iv. 205; in Rees Cycl. 88. Wimmer, Sal. Eur. 2. Anderss. DC. Prodr. xvi. (2), 273. Syme, E. B. viii. 251. B. White, Revision, 421.

Icon. E. B. S. No. 2624. Fl. Dan. 245. Syme, E. B. viii. t. 1367 (excluding enlarged stamens).

Exs. Hb. Linn. Nos. 55, 56, 57. Hb. Smith ("*S. lanata*, on rocks among ye Clova mtns. sparingly, Mr. T. Drummond, Mr. W. Robertson, 1825"). Wimmer, Sal. Relict. (Coll. Sal. No. 20). Hb. B. White, Nos. 319, 468. E. F. & W. R. Linton, No. 44.

A low-growing bush, 2–4 ft. high, with woolly-pubescent young branches and buds; year-old branches dark brown, here and there a little shining. Stipules foliaceous, often large ($\frac{1}{3}$–$\frac{1}{2}$ in. long), broadly ovate or ovate-lanceolate. Leaf-blades 1–2$\frac{1}{2}$ in. long by $\frac{1}{2}$–2$\frac{1}{4}$ in. broad, oval or round or oblong-obovate, entire, rounded, cordate or narrowed at the base, often undulate with twisted tip, clothed with long silky hair but sooner or later glabrescent, dull green above (often turning brownish-green when drying), glaucous or glaucous-green markedly reticulate and clothed with long silky hairs beneath. Catkins appearing in June or July with the leaves, often pale yellow at first with the dense yellowish silky hairs of the bracts; ♂ about 2 in. long, ovoid-oblong, subsessile, basal leaves 0 or very few; bracts narrowly obovate, obtuse or subacute, turning brown at the tip, filaments $\frac{2}{5}$ in. or more long, glabrous; nectaries linear-oblong, orange; ♀ elongate, 2–3 in. long by $\frac{1}{2}$–$\frac{3}{4}$ in. broad, shortly peduncled, with 0–4 basal leaves; bracts oblong-obovate subobtuse, as in the ♂ clothed with much long silky hair; ovaries $\frac{1}{4}$–$\frac{1}{3}$ in. long including the long styles, ovoid-subulate attenuate, glabrous, subsessile or lower ones shortly pedicelled; nectaries linear reaching above the base of the ovaries; stigmas small cleft or entire.

This arctic willow occurs at an elevation of 2000–3000 ft. in mountain corries of the Breadalbanes, Perthshire, sparingly, of the Clova district (Glen Doll, Glen Fiagh, and Canlochan Glen), Forfarshire, and in Glen Callater, Aberdeenshire, more plentifully. Europe: Norway, Sweden, Lapland, Arctic Russia; Siberia.

S. lanata × *caprea* (p. 49).
× *herbacea* (p. 80).
× *lapponum* (p. 75).
× *reticulata ?* (p. 76).

It has also been crossed in the garden with *S. repens* (E. F. & W. R. Linton, Nos. 99, 100), p. 76.

SALIX LANATA × LAPPONUM, hybr. nov.

[Exclude *S. lanata* × *lapponum* Linton in Journ. Bot. 1891, 215, which proved to be a form of *S. lapponum* with large broad leaf-blades.]

A small shrub, 1–2 ft. high, with short stout branches villous with loose subpersistent pubescence, becoming glabrous and dark brown hardly shining by winter; buds similarly pubescent during the growing season, hardly glabrescent till the winter. Petioles rather short, villous. Stipules foliaceous, oval, entire, grey-green. Leaf-blades 1–2 in. long, oval-oblong shortly acuminate mostly subacute, entire, softly pubescent on both sides, grey-green above, almost silvery-green beneath, the earlier ones clothed all over with long silvery hairs, which overlap the blade and form a silvery margin.

Foliage specimens only obtained, in 1897, from the same rocks near the head of Glen Callater, from which came the broad-leaved *S. lapponum* described in Journ. Bot. (*l. c. supra*). Its main characters may be thus described:—

SALIX LANATA × LAPPONUM, hybr. nov. Frutex 1–2-pedalis ramis villosis demum ad hiemem glabrescentibus; stipulæ sæpe adsunt foliaceæ ovales integræ; petioli sat breves villosi. Folia 1–2 unc. longa oblongo-ovalia breviter acuminata sæpe subacuta integra, molliter pubescentia, in novellis pilis argenteis infra longe crinita.

This plant, probably ♂ since no catkins survived, is nearer to *S. lapponum* in the shape of the leaf-blades, but differs from that species in the stouter branches, larger buds, in the long silvery hair clothing the leaf-blades beneath, persistent in the earlier ones, and in the foliaceous stipules present on the young shoots, such as *S. lapponum* never produces with us.

One or two plants among many of *S. lapponum* fringing the top of the cliff near the head of Glen Callater, Aberdeenshire, a little in the direction of Coire Ceannder.

[SALIX LANATA × REPENS Linton in Journ. Bot. 1898, 124.

Exs. E. F. & W. R. Linton, Nos. 99, 100, hybrids of garden origin.

A low-growing bush (No. 99), 2–3 ft. high; branches and buds pubescent. Stipules ovate-acuminate, rather large. Leaf-blades 1–2 in. long, oval-oblong, rounded at the base, obscurely serrate above the middle with few distant minute teeth, pubescent. Catkins ♀ coeval with the leaves in May, 1–2 in. long; bracts oblong-obovate rounded to subacute at the tip, clothed with much long silky hair; ovaries subulate, thinly pubescent; nectaries oblong, half as long as the elongate pedicels; styles very long, stigmas much shorter.

No. 100 differs from the above in the oblong-lanceolate leaf-blades sooner glabrescent, less silky catkins, glabrous ovaries and pedicels. The two forms of this hybrid are instructive in the manner of combining characters which are in strong contrast with one another, and producing what is seemingly a new willow with not much resemblance to either parent. Both were the product of *S. lanata* ♂ × *S. repens* ♀.]

SALIX LANATA × RETICULATA.

[*Syn.* Exclude × *S. superata* B. White, Revision, 423.]

Exs. Hb. E. F. Linton, No. 122*β*.

[Exclude B. White, No. 469; and E. F. & W. R. Linton, No. 101.]

No. 122 *β*. Branches short rather stout, woolly-pubescent at first, soon glabrous, at length yellowish-brown; buds oval to oval-obovoid sooner or later glabrous. Stipules varying from subulate to ovate-oblong. Leaf-blades ¾–1½ in. long, obovate entire rounded above, now and then retuse, or (later) apiculate or with a very short point sometimes twisted aside, narrowed gradually to the petiole, hardly any cuneate; softly pubescent with long silky hairs, usually glabrescent, dull green or yellowish-green (when dried) above, glaucous beneath and very reticulate with veins of greener hue; rather coriaceous, with veins impressed above and raised beneath on some of the earlier leaves, and with the margin sometimes narrowly reflexed.

The obovoid buds, the uniformly obovate leaf-blades and their base narrowed to the petiole, their coriaceous texture and the presence of impressed veins, separate this plant from those forms of *S. herbacea* × *lanata* which most resemble it, and afford fair evidence of *S. reticulata*.

The Glen Fiagh plant, issued in the Set, No. 101, is somewhat like the above, but lacks the impressed veins, and in E. S. Marshall's cult. specimens of the same shows some serration in the leaf-blade, which is evidence of *S. herbacea* origin.

A ♂ plant, found by E. S. Marshall on Meall na Saone in 1890, has also been named *S. lanata* × *reticulata*; but this, too, shows in some of its leaf-blades the serration of *S. herbacea*, and is *S. herbacea* × *lanata*.

S. J. Enander saw B. White's No. 469, the description of which is given in his Revision (p. 423), and wrote on it, "*S. herbacea* ×

lanata f. *sublanata* mihi (ad *S. herbaceam* saltem foliis basin versus serrulatis ac gemmis sat glabris refert)." The chief support of B. White's view lies in the structure of the nectaries being "split into 2 or 3 obcuneate pieces"; but, on the other hand, the short sessile catkins and the leaf-serration are fatal to his determination, and much in favour of *S. herbacea* × *lanata* as the true solution.

In a corrie on the north side of Meall na Saone, Perthshire.

Endemic in Scotland.

xii. MYRTOSALIX.

Myrtosalix Kerner, Nied. Œsterr. Weide, 47 (1859). Dwarf shrubs, flowering branches lateral; leaf-blades hairy, only while young, glossy green, soon glabrous; ovaries somewhat hairy, with pedicels not much exceeding the nectaries; anthers deep purplish-red; styles long, tinged with red.

16. SALIX MYRSINITES L. Sp. Pl. 1018. Sm. Fl. Brit. 1054; in Rees Cycl. 59; Engl. Fl. iv. 195. Hartman, 372. Wimmer, Sal. Eur. 97. Anderss. DC. Prodr. xvi. (2), 289. Syme, E. B. viii. 256. B. White, Revision, 432. Camus, Monogr. 111. Seemen, iv. 162.—*S. arbutifolia* Willd. Sp. Pl. iv. 2, 692 (1805). Sm. in Rees Cycl. 67. Syme, *l. c.* 257.—*S. procumbens* Forbes, 121. Syme, *l. c.* 257.

Icon. E. Bot. t. 1360. E. B. S. 2753. Forbes, tt. 60, 61 (*S. procumbens*). Syme, E. B. tt. 1375, 1376. Camus, Atlas, pl. 9, A, B.

Exs. Hb. Linn. Nos. 26 (2), 28, 29, 88. Hb. Borrer. Wimmer, Sal. Relict. (Coll. Sal. 120). E. F. & W. R. Linton, Nos. 23 (var. *procumbens*), 47. Enander, Nos. 53–56, 60, 61; 57 (var. *rotundifrons*); 52, 58, 59 (var. *latifrons*). Toepffer, Nos. 72, 231, 284.

A dwarf ascending or trailing shrub with stems 1–2 ft. long, branches rather stout, pubescent at first soon glabrous, in winter turning chestnut-brown ± polished; buds ovoid hairy at first, glabrescent. Petioles rather short. Stipules foliaceous on strong shoots, sometimes ¼ in. rarely ½ in. long, ovate to ovate-lanceolate, firm, shining green. Leaf-blades 1–2 in. long, usually ovate or ovate-oblong acute, sometimes a little obovate, broad or narrow, serrate or crenate-serrate, shining green on both sides, coriaceous, somewhat pubescent at first, soon glabrous, veins often raised above when dry. Catkins coeval with the leaves, fl. May, June; ♂ 1 in. long, subsessile, filaments glabrous or hairy near the base; anthers purplish-red (not violet as sometimes described); ♀ elongate 1–2 in. long, on leafy pubescent peduncles; bracts oblong-obovate, obtuse, clothed with silky hairs, reddish at first then blackened in the upper part; ovaries ovate-conic to ovate-lanceolate, pubescent but not densely, at length only thinly hairy, often reddish, subsessile at least at first; pedicels at length somewhat elongate about as long as the short quadrate nectaries, or twice as long at the base of the catkin; styles long red-veined, stigmas rather large, divided, usually purplish-red.

Syme (*l. c.*) distinguished *α serrata*, which appears to be the type; *β procumbens* (Forbes), a form with large oval leaf-blades and elongate catkins; and γ *arbutifolia* (Willd.), with narrow blades broadest above the middle, and rather large catkins. But, as B. White (*l. c.*) has observed, the shape and size of the catkins and leaves are subject to modification, and there does not seem any constancy in these or other characters to warrant the retention of any of these forms as varieties in the British list.

S. myrsinites occurs in mountain regions of Scotland from Argyllshire, Perthshire, and Forfarshire northwards to Orkney; as low as 300 ft. on limestone in Sutherlandshire, but usually from 1000 ft. upwards to 2800 ft. (Canlochen Glen and Meall Ghaordie). Central and Northern Europe, extending southwards to the Pyrenees, Apennines, and Carpathian Mountains; throughout the Arctic regions of Europe, Asia, and North America, where it descends to low levels.

S. myrsinites × *Andersoniana* (p. 65).
× *Andersoniana* × *aurita* (p. 44).
× *Andersoniana* × *phylicifolia* (p. 66).
× *arbuscula ?* (p. 73).
× *aurita* (p. 43).
× *caprea* (p. 51).
× *herbacea* (p. 82).
× *lapponum* (p. 36).
× *phylicifolia* (p. 78).

SALIX MYRSINITES × PHYLICIFOLIA.

[*Syn.* Exclude *S. Normanni* Anderss. in DC. Prodr. xvi. (2), 288, *fide* S. J. Enander.]

Exs. E. F. & W. R. Linton, Nos. 103 (♀), 104 (♂). Hb. E. F. Linton, Nos. 12, 54. Enander, ii. No. 84?

A low-growing shrub, keeping a dwarf habit in the garden, with short stout branches often pubescent at first, soon glabrous, at length dark brown ± polished; buds ovoid, soon glabrous, at length polished chestnut-brown. Petioles short or moderately long. Stipules seldom seen; frequent on No. 103, ovate-acuminate, shining green on both sides (like those of *S. myrsinites*). Leaf-blades 1–2 in. long, ovate-oblong, oval-acuminate, or sometimes obovate-oblong, lower ones much narrower, obtuse or subacute, entire at the tip, ovate rounded or narrowed at the base; serrate or crenate-serrate, usually somewhat pubescent at first and soon glabrous; ± deep green above, paler green often shining beneath, or (No. 104) later ones glaucous. Catkins fl. May, June, shortly before (or ♀ with) the leaves; bracts obovate-oblong or oblong-acuminate, clothed with long silky hair, reddened below the blackened upper margin, upper obtuse or rounded, lower sometimes acute; ♂ $\frac{3}{4}$–1 in. long, ovoid to cylindric, filaments glabrous, anthers red-tipped or reddish; ♀ elongating (1–2 in.), with a few narrow silky leaves on the pubescent peduncles; ovaries narrow, subulate-conic, silvery pubescent; pedicels pubescent longer than the oblong red-tinged nectaries; styles long red-veined, longer than the large bifid stigmas.

Found in Glen Fiagh, Forfarshire, No. 54, ♂, and No. 12, ♀

(ex hb. A. Somerville); and on Little Craigindal, Aberdeenshire, No. 104. Europe: Norway?

xiii. HERBACEÆ.

Anderss. DC. Prodr. xvi. (2), 297. Stems ± underground; branches very short, few-leaved. Leaf-blades shining, reticulate-veined; veins pellucid. Catkins terminal leaf-opposed with a bud between; ovaries glabrous, subsessile or pedicels shorter than the internal nectaries.

17. **SALIX HERBACEA** L. Sp. Pl. 1018. Sm. Fl. Brit. 1056; in Rees Cycl. 66; Engl. Fl. iv. 199. Seringe, Essai, 86. Wade, 198. Hartman, 373. Wimmer, Sal. Eur. 125. Anders. DC. Prodr. xvi. (2), 298. Syme, E. B. viii. 259, t. 1378. B. White, Revision, 437. Camus, Monogr. 106. Seemen, iv. 64.

Icon. E. Bot. t. 1907. Forbes, t. 62. Hoffm. Hist. Sal. t. 20, f. 1–4. Fl. Dan. t. 47. Camus, Atlas, pl. 8, A.

Exs. Hb. Linn. Nos. 34, 35, 36, *a*, *b*. Hb. Borrer. Wimmer, Sal. Relict. (Herb. Sal. No. 40; Coll. Sal. 125). Billot, No. 1964. Hb. B. White (8 sheets, not numbered). E. F. & W. R. Linton, No. 48. Enander, Nos. 20, 21. Toepffer, Nos. 27, 28, 70.

Very dwarf, stems much branched, mainly under soil, moss, or stones, branches short 3–5-leaved, glabrous (or rarely pubescent at first); buds ovoid, glabrous or very soon glabrescent. Stipules 0, or rare, minute ovate. Leaf-blades ¼–1 in. long, commonly round, sometimes broadly ovate or roundly obovate, round or retuse at the tip, base usually cordate, or rounded; serrate or crenate-serrate from the base with incurving teeth, sometimes crenate, glabrous, green on both sides, shining, often more glossy below than above. Catkins ¼–¾ in. long, following the leaves in June or July, on short leafless pubescent peduncles, terminal, leaf-opposed with a bud between, round or shortly oblong; ♂ small, ¼ in. long, few-flowered, filaments glabrous, anthers sometimes tipped with red; ♀ ¼–½ in. long, elongate to nearly an inch rarely, 3–12-flowered; bracts oblong or narrowly obovate obtuse, involvent, with reddish margin above, glabrous or thinly pubescent; ovaries ovate-conic obtuse, glabrous, often turning reddish or purplish-red, subsessile or shortly pedicelled in fruit; nectaries single or double, external linear or sometimes obsolete, internal linear or sometimes cleft, usually exceeding any pedicel; style variable, not very long, often divided below the stigmas nearly to the base.

There is a wide difference of aspect between the very small-leaved form of exposed ridges and mountain-tops and a large-leaved form or state on wet rocks; the latter sometimes has the stem partially exposed through denudation of the soil. There is a slight variation in the ♀ catkin, the ovaries having sometimes (as B. White pointed out, *l. c.* p. 437) a few hairs or even lines of hairs from the base upwards, and the pedicels being sometimes silkily pubescent also. The latter is a slight and inconstant modification, the former due to situation and character of the soil, but neither affords any ground for making variations of the British plant.

S. herbacea occurs on mountains in three Welsh counties and three in the North of England; in nearly half the counties of Ireland, and more than half the counties of Scotland. It ascends to 4300 ft. on Ben Nevis, and has been found as low as 500 ft. in Shetland (W. H. Beeby), and 300 ft. near Oykell Bridge, in Sutherland (E. S. Marshall). Throughout the Arctic and northern regions of Europe, Asia, and North America; the Alps of France and Switzerland, Pyrenees, Apennines, Roumanian and Bulgarian Mountains, Germany, Austria, and Tirol.

S. herbacea × *Andersoniana* (p. 65).
× *arbuscula* (p. 72).
× *aurita* (p. 42).
× *lanata* (p. 80).
× *lapponum* (p. 80).
× *lapponum* × *myrsinites* (p. 81).
× *myrsinites* (p. 82).
× *phylicifolia* (p. 83).
× *repens* (p. 84).
× *reticulata* (p. 85).

SALIX HERBACEA × LANATA.

Syn. *S. Sadleri* Syme in Trans. Bot. Soc. Edinb. xii. 208 (1875), cum tab.—*S. Stephania* B. White, Revision, 424.—*S. lanata* × *herbacea* Lundström apud Strömfelt, Sv. Vet.-Akad. Förhandl. No. 8, 116 (1884). Linton in Journ. Bot. 1896, 469.—*S. Sommerfeltii* Anderss. DC. Prodr. xvi. (2), 291, pro pte., *fide* S. J. Enander.

Icon. Enander, Sal. Scand. exs. Nos. 41½, 45.

Exs. Hb. B. White, No. 466. E. F. & W. R. Linton, No. 105. Enander, Nos. 41–46.

A dwarf shrub with branches somewhat pubescent at first, soon glabrous; buds oval, glabrescent. Stipules ovate. Leaf-blades ¾–1½ in. long, orbicular or broadly ovate, cordate or rounded at the base, rounded or mucronate or subacute at the tip, crenate-serrate or serrulate or subentire, pubescent while young, soon glabrescent, ± glaucous beneath. Catkins ♀, fl. June, July, ½–1 in. long, on lateral leafy peduncles; bracts roundly obovate or spathulate turning brown above, clothed with long silky hairs; ovaries subulate to ovoid-conic, chiefly subsessile, glabrous; pedicels glabrous or sometimes pubescent, the longest about as long as the linear nectaries; styles and stigmas rather long.

This rare hybrid has been found in four localities in Perthshire; in Glen Fiagh, Forfarshire; and Glen Callater, Aberdeenshire. Europe: Norway, Sweden, Iceland, Finland.

SALIX HERBACEA × LAPPONUM Lundström Studier ö. Salixlaktet (1875), see Enander, exs. No. 26. Seemen, iv. 325.

Syn. *S. ovata* (Sér.) Anderss. Sal. Lapp. 81, and DC. Prodr. xvi. (2), 287.—*S. phæophylla* (*S. lapponum* × *myrsinites*) Anderss. in Bot. Not. 16 (1867).—*S. sobrina* B. White, Revision, 440.

Icon. Enander (in exs.), Nos. 27, 29½, 30, 32, 33, 39½, 40.

Exs. Hb. Linn. No. 68*a*. Hb. Smith ("*Salix elliptica* nov. sp. Clova Mountains, Mr. Thos. Drummond, Mr. W. Robertson, 1825"). E. F. & W. R. Linton, Nos. 75. Enander, Nos. 25, 26, 28, 29, 31, 34–39.

A dwarf decumbent shrub, rarely suberect, with slender branches pubescent at first, sooner or later glabrescent, at length dark brown and often polished. Stipules 0. Leaf-blades ½–1½ in. long, usually oval or oval-oblong, sometimes roundly oval, subacute, or more often obtuse or rounded at the tip, subcordate, rounded or ovate at the base, subentire, crenate or crenate-serrate, pubescent at first, often ± glabrescent; veins often impressed above. Catkins coeval with the leaves, fl. June–July, on 3–4-leaved pubescent peduncles; bracts obovate and rounded above, more rarely obovate-spathulate obtuse, turning brown or sometimes reddish upwards, rather thinly pubescent, ciliate with silky hairs; ♂ catkins ½–¾ in. long, slender or (in one form) rather broadly ovoid-oblong; ♀ ½–1¼ in. long, dense-flowered, seldom lax even at the base; ovaries ovoid-conic or sometimes shortly ovoid, sessile or lower ones pedicelled, tomentose at first, often becoming thinly pubescent; pedicels usually pubescent and shorter than the linear nectaries, lower ones sometimes exceeding them; styles long or at least longer than the moderate stigmas.

A monœcious form occurred in Glen Fiagh, with ♂ and ♀ catkins ¼–½ in. long, the ovaries also of small size and crowded together.

S. J. Enander describes in his *Exs.* several forms and subforms, which show much variation in the clothing of the ovaries as well as other characters. Our forms, varying in leaf-characters, bracts and pedicels, are fairly constant in the ovaries being covered with whitish pubescence at first, which thins out as the capsule ripens.

S. herbacea × *lapponum* has been found on Meall na Saone, in Glen Tilt, and on the Glen Lyon side of Meall Garbh, in Perthshire, in the Clova district, chiefly in Glen Fiagh, Forfarshire, and sparingly, in Glen Callater, Aberdeenshire. S. J. Enander issues or records it from several localities in Norway and Sweden.

Salix herbacea × lapponum × myrsinites.

Syn. *S. eugenes* Linton in Journ. Bot. 1892, 364 (as *S. myrsinites* × *reticulata*).—*S. herbacea* × *myrsinites* × *lapponum* Seemen, iv. 326.—*S. lapponum* × *myrsinites* × *herbacea* Floderus in Bih. Sv. Vet.-Akad. Handl. xvii. Afd. iii. No. 1, 44 (1891).

Exs. E. F. & W. R. Linton, No. 106. Hb. E. F. Linton, No. 53. Hb. W. R. Linton, No. 118. Hb. E. S. Marshall, No. 2793.

A dwarf shrub with decumbent stems, branches slender pubescent at first, at length glabrous. Stipules 0. Leaf-blades oval-oblong, rounded or cordate at the base, obtuse or acute, serrate (with erect teeth) or crenate-serrate, rather coriaceous, green and glabrescent above with the veins often impressed, paler green and pubescent beneath, with long silky deciduous hairs on the earlier leaves, veins raised opaque often reddish. Catkins ♀ about ½ in. long, appearing with the leaves in June, on pubescent 2–3-leaved peduncles; bracts broadly obovate, thinly clothed and ciliate with long silky hairs, somewhat reddish below the dark brown rounded margin; ovaries ovoid-conic, mostly subsessile, subtomentose at first but soon dark grey and thinly pubescent; pedicels pubescent, much shorter than the lingulate or linear-oblong nectaries as a rule, those at the base of the catkin sometimes as long; styles very long, red-veined, stigmas large bifid.

S. eugenes is much like a form of *S. herbacea* × *lapponum*, for which it has been mistaken, in habit and general appearance, but differing from it in some points in which the influence of *S. myrsinites* is apparent; leaf-blades of firmer texture, more serrate with serratures erect and not incurved, nerves opaque reddish; ovaries at length thinly pubescent, with the dark-grey look of the ovaries of *S. myrsinites*; nectaries rather broad not merely linear; styles very long reddish, showing red veining under a lens, stigmas large. The marked reticulation under the leaves in an early stage recalled *S. reticulata*, which was at first thought to be an element in its composition; the raised veins, however, and their opacity may be a further evidence of the presence of *S. myrsinites*.

This hybrid has been found, on more than one occasion, in a part of Glen Fiagh, Forfarshire, rich in alpine willows. Recorded by Floderus from Scandinavia.

Salix herbacea × myrsinites.

Syn. *S. Grahami* (Borrer MS.) Baker in Journ. Bot. 1867, 157. Syme, E. B. viii. 257. J. D. Hooker, Stud. Fl. Brit. Isl. ed. 3, 376. B. White, Revision, 437. E. F. Linton in Ann. Scot. N. H. (1894), 239, and in Journ. Bot. 1896, 470 (*S. myrsinites* × *herbacea*).

Icon. Journ. Bot. (1867), t. 66 (except glaucous underleaf). Syme, *l. c.* t. 1377 (enlarged ovary incorrect).

Exs. Hb. Borrer ("*Salix* —, Sow of Atholl, J. Ball, from C. C. Babington"). Hb. Edinb. ("*S. herbacea* L. Rocks above Loch Ceannder, Aug., 1830"; "var. *elliptica* Grev. MS."—this would be from Glen Callater, Aberdeenshire). E. F. & W. R. Linton, No. 25. Hb. E. F. Linton, Nos. 123 *β*, 270.

S. Grahami is a dwarf shrub with a prostrate habit, branches rather long slender, pubescent while young, when 1-year-old ± polished dark brown; buds oval, soon glabrescent. Stipules ovate-oblong, acute or acuminate, rather coriaceous, shining on both sides, often present in cultivation on strong shoots. Leaf-blades ½–1 in. (–1½ in. cult.) oval-oblong, at length usually oval-orbicular, subentire when young, then crenate-serrate, rounded or obtuse often apiculate, truncate or rounded at the base, sometimes subcordate, reticulate with raised veins and glossy green on both surfaces, pubescent, becoming glabrous above. Catkins ♀, fl. June–July with the leaves, ½–¾ in. long, elongate to 1½ in. in fruit, rather lax below, with a few oval leaves on the pubescent peduncle; bracts involvent oboval with a rounded reddish upper margin, pubescent below and ciliate; ovaries at length ¼ in. long, ovoid-conic to ovoid-lanceolate, subsessile or lower shortly pedicelled, pubescent near the base, otherwise glabrous; pedicels pubescent, not exceeding the oval-oblong nectaries; styles long, stained or veined with red, stigmas rather large, bifid.

A somewhat similar plant, with the leaf-blades of a less glossy green, the ovaries thinly pubescent all over, ± glabrescent in the lower part, and with broadly linear nectaries, was gathered on Meall na Saone, Perthshire, in 1891 (No. 123 β), and shows the same rubescence of the bracts, styles and stigmas as *S. Grahami*. Probably both plants are of the same parentage.

S. herbacea × *myrsinites* has occurred in Perthshire, Glen Callater, Aberdeenshire, and at Frouvyn, Sutherland. Reported from Tirol and Scandinavia (excluding *S. Sommerfeltii* Andersson, which S. J. Enander states is *S. herbacea* × *lapponum*, pr. pte., and *S. herbacea* × *lanata*, pro pte.).

Salix herbacea × phylicifolia Linton in Journ. Bot. 1896, 470, 471.

Icon. Enander, Sal. Scand. exs. No. 22.

Exs. E. F. & W. R. Linton, No. 108. (For *S. Moorei*, No. 109, see below.)

The plant (No. 108, *suprà*), raised from seed of *S. herbacea* ♀, fertilized by *S. phylicifolia* ♂, and grown at Bournemouth, is a small shrub of suberect habit with glabrous branches and buds. Stipules rare, minute ovate. Leaf-blades ovate- to obovate-oblong, serrate, glabrous, pale green or glaucous beneath. Catkins ♀, dense-flowered in April or May, ¾–1¼ in. long, on short 2–4-leaved pubescent peduncles; bracts narrow oblong to obovate-oblong, obtuse rarely subacute, slightly pubescent with long white hairs; ovaries ovoid-conic, grey-pubescent; pedicels about as long as the oblong nectaries, the lower ones often longer; styles long, stigmas divided nearly as long.

This form of the hybrid has the habit and appearance of a *S. phylicifolia* form; so much so that S. J. Enander, on first seeing specimens (No. 108, in the British Museum), named it "*S. phylicifolia* var."

Very different in habit is the Irish plant known as *S. Moorei*, which, whether its other parent was *S. phylicifolia* or not, has obvious affinity with *S. herbacea*.

Syn. × *S. Moorei* ("Watson, L. C.") B. White, Revision, 438.—*S. Grahami* D. Moore in Journ. Bot. 1871, 300. Bab. Man. ed. viii. 331. — *S. Grahami* Baker b. *Moorei* Lond. Cat. ed. 7.—*S. herbacea* × *phylicifolia* Linton in Journ. Bot. 1896, 470.

Exs. E. F. & W. R. Linton, No. 109.

A dwarf low-growing shrub, stems decumbent or ascending, branches pubescent at first, soon glabrous, at length ± polished dark brown; buds ovoid-oblong acute to subacute, soon glabrescent. Stipules 0. Leaf-blades ½–2 in. long, oval to oval-oblong, serrate or crenate-serrate, tip entire, pubescent at first, soon glabrous, shining and at length reticulate above, paler green not shining beneath. Catkins ½–1¼ in. long, fl. May with the leaves, on pubescent 3–4-leaved peduncles, lax-flowered below; bracts linear-oblong to oblong-spathulate, thinly hairy on and near the margins, reddish above; ovaries ¼ in. (or ⅓ in. with the style) ovoid-lanceolate, pubescent in the upper half then subglabrescent; pedicels thinly pubescent elongate, at length 2–3 times as long as the linear nectaries; stigmas cleft, rather shorter than the long styles.

This singular hybrid was discovered on Muckish Mt., Donegal, by Dr. David Moore, and described by him, as a "form of *S. arbuscula*," in Journ. Bot. 1870, 209; and, thanks to Sir F. W. Moore, who sent it me from Glasnevin Gardens, has been under observation in the garden for many years. That *S. herbacea* is one of its parents is obvious. As to the other, there has been some difference of opinion. B. White (*l. c.*) suggested *S. nigricans*, which would account for the pubescence of the foliage but not for its bright colouring and the absence of any blackening when dried, nor for the pubescence on the ovaries. S. J. Enander wrote his opinion on the sheet (No. 109) in the British Museum that it was *S. herbacea* × *lapponum*; and on learning that *S. lapponum* was not an Irish species, suggested in a letter that it was a form of *S. cernua* (*S. herbacea* × *repens*). The pubescence of the young twigs and leaves would thus be accounted for, and the habit of the plant. On the other hand, from this combination narrower leaves and short obtuse buds and rather short styles would be expected; whereas the leaf-blades are broadly oval, the buds pointed and often subacute, and the styles remarkably long. *S. Moorei* is therefore left under *S. herbacea* × *phylicifolia*, as its probably right place.

Native only in Donegal, Ireland; and in Jemtland, Sweden.

SALIX HERBACEA × REPENS.

Syn. *S. cernua* Linton in Journ. Bot. 1894, 202, and 1897, 362.—*S. herbacea* × *repens* E. S. Marshall & W. A. Shoolbred in Journ. Bot. 1909, 223. Seemen, iv. 323.

Exs. Hb. E. F. Linton, No. 49. Hb. W. R. Linton, Nos. 121, 148 b (♂). Hb. E. S. Marshall, Nos. 2965, 2966, 2969. E. F. & W. R. Linton, Nos. 110, 111.

A very dwarf prostrate or ascending shrub with slender branches pubescent at first; buds ovoid, pointed or obtuse, soon glabrescent. Stipules 0. Leaf-blades $\frac{1}{4}$–$\frac{3}{4}$ (–1 cult.) in. long, usually ovate or oval sometimes obovate, serrate with small rather distant teeth or subentire, rounded or narrowed at the base, thinly or silkily pubescent at first, glabrescent and reticulate on the upper surface, dull green or glaucous green beneath. Catkins coeval on leafy peduncles, fl. May, June; ♂ $\frac{1}{4}$–$\frac{1}{2}$ in. long, with oblong or slightly obovate bracts obtuse or rounded above, crimson-rimmed, thinly ciliate, otherwise glabrous, concave; filaments glabrous; nectaries two (one in front of and one behind the filaments) linear-oblong; anthers fading a light brown; ♀ $\frac{1}{4}$–$\frac{3}{4}$ in. long on 3-4-leaved pubescent peduncles, somewhat elongate in fruit; bracts obovate-oblong, rounded above, ciliate and with some hairs above otherwise glabrous, involvent, light green or turning reddish upwards; ovaries ovoid-conic, somewhat pubescent or glabrous; nectaries linear to oval-oblong, pedicels glabrous, as long as the nectaries at first, at length 2–3 times as long; style stout as long as the rather large divided stigmas.

f. *microphylla*, very dwarf, branches 2–3 in. long, leaf-blades ¼ in. long, broadly oval; catkins about ¼ in. long, 3–5-flowered; ovaries pubescent at first becoming glabrous.

This hybrid was first discovered by me in 1889, at Little Craigindal, Aberdeenshire, grown at Bournemouth, and described (*l. c.*) in 1894. In 1896 E. S. Marshall found three plants, including f. *microphylla*, by the Lochy Burn, Glen Shee, Perthshire; another plant between Loch Callater and Lochnagar, Aberdeenshire, in 1908; and once more, in Ross-shire (No. 2969), in 1909. There is a foliage specimen in hb. Edinburgh, labelled "St. Kilda, 1889, *Salix* —, A. H. Gibson," which is apparently the same hybrid.

S. herbacea × *repens* is endemic in Scotland.

SALIX HERBACEA × RETICULATA Linton in Journ. Bot. 1892, 365. [*S. onychiophylla* (*S. herbacea* × *reticulata*) N. J. Andersson is *S. herbacea* × *lapponum* pr. pte. and *S. herbacea* × *lanata* pr. pte., *fide* Enander, Sal. Scand. exs. i. Nos. 26, 41.]

Icon. Enander (*l. c.*), i. Nos. 3, 4, 6, 7½, 8.

Exs. E. F. & W. R. Linton, No. 112. Enander, Nos. 5, 7.

A dwarf creeping shrub, 3-6 in. high, with branches and buds glabrous or soon glabrescent. Stipules 0. Leaf-blades ½–1 in. long, roundly oval, or obovate, entire, pubescent at first, dark green and glabrescent above, glaucous, reticulate with raised veins, and pubescent with long silky hairs beneath. Catkins ½ in. long, fl. June, July, on hairy peduncles with 3–4 oval leaves; bracts broadly obovate rounded at the tip, clothed with long yellowish silky hair, reddish at first then turning dark upwards; anthers tipped with red; nectaries long linear, double in the lower and apparently single in the upper flowers. A plant from Meall Ghaordie, Perthshire, with pubescent ovaries and less pubescent bracts drying light brown, is thought by S. J. Enander to be the ♀ of this hybrid.

A foliage specimen, collected by W. A. Shoolbred in W. Inverness, is also determined *S. herbacea* × *reticulata* by Enander. This has much larger oval-obovate leaf-blades 1–1½ in. long, entire, mostly glabrous, glaucous (and the lower ones silky) beneath, with reddish midribs; 1-year-old twigs polished dark brown.

The localities for the three plants regarded as *S. herbacea* × *reticulata* are Glen Fiagh, Forfarshire, Meall Ghaordie, Perthshire, and Aonach Beg, Inverness. Europe: Norway, Sweden.

xiv. RETICULATÆ Anderss. in DC. Prodr. xvi. (2), 300.

Dwarf shrubs with short branches prostrate or ascending. Leaf-blades orbicular or obovate, glaucous and with raised reticulate veins beneath. Catkins terminal, long peduncled; ovaries pubescent subsessile; nectaries laciniate surrounding their base.

18. SALIX RETICULATA L. Sp. Pl. 1018. Sm. Fl. Brit. 1052; in Rees Cycl. 75; Engl. Fl. iv. 200. Wade, 218. Seringe, Essai, 27. Hartman, 374. Wimmer, Sal. Europ. 129. Anderss. DC. Prodr. xvi. (2), 301. Syme, E. B. viii. 260, t. 1379. B. White, Revision, 443. Camus, Monogr. 129. Seemen, iv. 67.

Syn. *Chamitea reticulata* Kerner, Verh. Zool. Bot. Ges. Wien. x. (1860), 277.

Icon. Hoffmann, t. 25, f. 1, 2; tt. 26, 27. E. Bot. 1908. Forbes, t. 67. Fl. Dan. 212. Camus, Atlas, pl. 9, J–M. Enander, Sal. Scand. exs. 1 *b*, *c*, *d*, *f*; 2 *b*, *c*, *d*.

Exs. Herb. Linn. Nos. 37, 38. Herb. Borrer. Leefe, Sal. Brit. exs. No. 49. Hb. B. White, No. 313, &c. E. F. & W. R. Linton, No. 50. Enander, Nos. 1 *a*, *e*; 2 *a*. Toepffer, Nos. 87, 88; 89, 90 (var. *sericea*).

A compact dwarf shrub with stems on the ground often buried in moss; branches short, ascending, few-leaved, glabrous or soon glabrescent, at length dark brown ± polished; buds oval hairy at the tip at first, their scales often persistent, flower-buds large, olive to olive-brown. Petioles rather long, often tinged with red; stipules 0. Leaves few; blades ½–2 in. long, broadly or narrowly oboval, or oval, or sometimes almost circular, rounded or cordate at the base, or more rarely narrowed to the petiole, rounded above, sometimes apiculate or retuse, entire or with minute gland-tipped nerve-points but scarcely denticulate, margin often reflexed; coriaceous, clothed with long silky hair while young, soon glabrous deep green and rugose with impressed nerves above, glabrescent rather later and very glaucous and reticulate with raised buff or reddish-buff nerves beneath. Catkins developed after the leaves, fl. June, July, terminal, leaf-opposed with a bud between, slender in flower, on rather long pubescent peduncles; ♂ ½–¾ in. long, peduncled; bracts obovate or roundish-obovate, clothed with woolly pubescence, light brown; anthers reddish at first, filaments pilose at the base; ♀ ½–1¼ in. long, on rather longer and stouter peduncles (½–1 in. long); bracts like those of the male or darker brown; ovaries white-tomentose sessile or the lowest subsessile; ovaries ⅛–⅙ in. long, broadly ovoid or ovoid-conic, obtuse turning reddish-brown in maturity; nectaries 2–4 partite embracing the base of the ovaries; styles short stout.

S. reticulata is found at 2200–3600 ft., frequently in the Breadalbane Mountains, Perthshire, and formerly in the Clova Mountains, Forfarshire, where it is now rather scarce; Glen Callater, Aberdeenshire; recorded also from Inverness and Sutherland (no specimen seen). Pyrenees; Iceland and Arctic Europe; Arctic Asia; N. America, Labrador, Greenland.

S. reticulata × *Andersoniana ?* (p. 68).
× *herbacea* (p. 85).
× *lanata* (p. 76).
× *lapponum* (p. 38).

THE DESIGNATION OF HYBRID WILLOWS.

In this paper hybrids are usually designated by the names of the parent species with a × between them, and the alphabetic order was adopted from the first, with two exceptions. A third exception arose in the course of the work through a change in the name of a species.

1. Since the *Synandræ* are distinguished by the connation of the filaments from all others which have the filaments free, the hybrids of *S. purpurea*, which all partake of this peculiarity in a greater or less degree, are kept in one group with *S. purpurea*, instead of being dispersed in observance of the alphabetic rule.

2. Another group of hybrids are kept together on account of their close alliance and general resemblance, *viz.*, those of *S. viminalis* with the three British species of *Capreæ*. The difficulty of distinguishing these according to their parentage was evaded by Andersson, in whose account (DC. Prodr. xvi. (2), 264–268) they are placed below *S. viminalis*, thus:—

× *S. stipularis* Sm.
    β *vestita.*
× × *S. Smithiana* Willd.
    α *sericans* (Tausch).
        var. *latifolia.*
        var. *angustifolia.*
        var. *subobscura.*
    β *velutina* Schrad.
        var. *ferruginea* (Forbes).
    γ *acuminata* Sm. (*S. caprea-dasyclados* Wimmer; *S. Calodendron* Wimmer).

B. White (Revision, 414) states and criticizes this arrangement, remarking that if *S. caprea*, *S. cinerea*, and *S. aurita* are retained as distinct species, their several combinations should have separate recognition. But on account of the "almost insurmountable difficulty of distinguishing between them," he decided to adopt a slight modification of Andersson's arrangement.

Recognizing that the hybrids of *S. viminalis* with *S. aurita*, *S. caprea*, and *S. cinerea* are very closely allied and not always easily distinguished, I have given them a position under *Viminales*, and grouped with them *S. stipularis* Sm. and *S. acuminata* Sm., which have been suspected of having a similar though unascertained origin. This is practically Wimmer's method (Sal. Eur. 174–190), who, however, imposed a fresh name (*S. Calodendron*) on *S. acuminata*, and added *S. holosericea* Willd., ♂, as a separate member of the group.

3. Another breach of the rule of alphabetic order occurs in the hybrids of the same three species of the *Capreæ* with *S. Andersoniana* (*S. nigricans*) Sm. The descriptions of these were in type and in position before it was finally decided to pass over

S. nigricans Sm. (as a *nomen confusum*), and to revive the name *S. Andersoniana* Sm. in its stead. The "Synoptic Table of Species and Hybrids" was recast, and the first eight pages were reissued, showing this change of name with some of the consequent changes of order; but in the *Capreæ* (pp. 5, 6) the order was left as before to accord with the arrangement of the hybrids in the body of the work.

The name *S. Andersoniana* was given by Smith in honour of George Anderson, in reference to whom and to Edward Forster, after whom he named *S. Forsteriana*, he writes: "Two names more dear than these, to the memory of their friends or to botany, can scarcely be recorded in the history of science" (Eng. Fl. iv. 224).

Note on S. Boydii (p. 38).

Mr. W. Boyd, who discovered *S. Boydii* as a seedling plant in Glen Fiagh, and has grown it and cuttings from it in his garden at Faldonside, writes: "I have four or five plants, and none of them are more than fourteen inches high, and very stiff in their growth; so, as they are seven or eight years old, I take it to be full grown."

This dwarf habit, which is also maintained in my own garden, is a strong confirmation of the view that *S. reticulata*, which is of a compact dwarf and rigid habit, is one of the parents of this very distinct and remarkable hybrid. *S. lapponum* is of a lax habit, unless growing on rocks, and in a peat bed in the garden attains a height of about five feet.

ADDENDA ET CORRIGENDA, &c.

Page 16, line 23, for subs. read subsp.
,, 19, ,, 16, after 33, add 113.
,, 19, ,, 10 from bottom, after Perthshire. add Ireland, near Limerick.
,, 20, ,, 20, 21, *dele* Ireland, near Limerick.
,, 25, ,, 4, for (1800); Döll. read (1809); Döll (ex Koch Synopsis, ed. 2, 744).
,, 26, ,, 3, for Zetschr. read Zeitschr.
,, 27, ,, 24, after (1845) add Nachtr. 476
,, 30, ,, 12, for Döll. read Döll
,, 36, ,, 11, after *arbuscula* add (p. 73).
,, 36, ,, 14, after *herbacea* add (p. 80).
,, 36, ,, 15, after *lanata* add (p. 75).
,, 39, ,, 29, after 89 add 116.
,, 41, ,, 20 from bottom, after 17 add 119.
,, 46, ,, 25, for (Herb. Sal.) read (Herb. Sal.
,, 47, ,, 17, after 54 add 114.
,, 49, ,, 5, for "♀ the" read the ♀
,, 52, ,, 6 from bottom, for style read styles
,, 53, ,, 13 from bottom, for Doell. read Doell,
,, 54, ,, 5, after 62 add 117, 118
,, 64, ,, 12, add —*S. arbuscula* × *nigricans* E. F. Linton in Journ. Bot. 1891, 214.
,, 68, ,, 28, after p. 65, add, where I have placed it as *S. Andersoniana* × *herbacea?*

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Names of groups are printed in small capitals. The accepted names of British species are in leaded type. British hybrids, varieties, and synonyms are printed in ordinary Roman letters, and those which are not known as British in italics.

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FURTHER

NOTES ON THE FLORA OF DENBIGHSHIRE.

By ARTHUR A. DALLMAN, F.C.S.

Since the publication of a preliminary list of Denbighshire plants with the *Journal of Botany* for 1911, so much new material has come to hand that it seems desirable to publish a supplementary paper, as this tentative list has served a very useful purpose. I regret to note the loss of three valued contributors during the past year, and the previous and present paper show that much is owing to the generous co-operation of the late Miss Hilda M. Williams, of Aston, Mr. W. Hodge (Northwich), and Mr. T. Ruddy, of Llangollen. The present contribution, like the former, is essentially systematic, and is mainly concerned with the less common Phanerogamia and Pteridophyta. Species unrecorded for v.-c. 50 in *Topographical Botany* or in Mr. Bennett's Supplement (*Journ. Bot.* Suppl. 1905) are asterisked. Book records and commoner species are purposely excluded. A mark of exclamation is prefixed to records where I have seen a specimen of the plant or independently confirmed the same; in many cases so indicated I have been present with the finder and seen the plant *in situ.*

A number of herbarium records are from three collections which had not been previously examined. The late Miss E. M. Wood, of Birkenhead, formed a collection of two hundred Phanerogamia and Cryptogamia illustrative of the flora of Llansannan, which was exhibited and awarded a prize at the Welsh National Eisteddfod held at Rhyl in 1904. The collection (*Hb. Wood*) is contained in three bound volumes, and is now in the possession of Mr. John Morris, of Liverpool and Llansannan, who has kindly placed it at my disposal. The late Mr. Ruddy collected a considerable number of British plants, which are contained in a large volume (*Hb. Ruddy*), now in the possession of his daughter, Miss C. E. Ruddy, of Rhyl, who has kindly given me facilities for examining it. This supplies many North Wales and Denbighshire records, most of the latter being in the Llangollen district.

The herbarium of Mr. W. Whitwell (*Hb. Whitwell*) includes many North Wales plants and supplies numerous Denbighshire records. I have to thank Mr. Whitwell for a very complete list of these plants, the loan of herbarium sheets, and considerable assistance in other ways. Most of these records refer to plants seen or collected between 1862 and 1875. Contrary to expectation, the herbarium of John Williams at University College, Bangor, which by the courtesy of Professor R. W. Phillips was kindly examined for me by Mr. R. H. Day, supplies no information on the flora of our area.

For much of the additional material which has accrued during the past two years I am indebted to the active co-operation of many local botanists and observers. To Miss F. M. Thomas and Dr. E. J. Haynes Thomas, of Chester, I am under a special obligation for much valued help in many ways. Thanks are also due to Miss E. Foulkes Jones, also of Chester, Mrs. Evans Jones (Dyserth), Mrs. New (Backford), Mrs. Phillips (Caergwrle), Miss C. E. Ruddy (Rhyl), and Miss C. I. Thomas, of Chester. Particular acknowledgment is due to Mr. J. L. Harnaman (Derwen) and Mr. J. M. Harnaman (Alvanley). I have also to thank Mr. R. H. Day (Cwm), Dr. H. Drinkwater (Wrexham), Mr. G. Loftus (Liverpool), Dr. W. B. Russell (Colwyn Bay), Mr. J. Southworth (Stoke-on-Trent), Mr. C. Waterfall (Chester), and Mr. W. E. Williams, of Eglwys Fach. There are several genera, the occurrence and distribution of which are only very imperfectly worked out as yet, and I would commend these to the notice of local workers. Examples of this are provided by *Rosa*, *Carex*, *Potamogeton*, *Rubus*, *Salix*, and *Callitriche*.

During the summer of 1911 I resided in the county for about a month. The picturesque and secluded little hamlet of Eglwys Fach (= "Little Church"), in the Conway Valley, proved a convenient centre for exploring some interesting country, of which little was known. The underlying rocks hereabouts consist of Denbighshire Grit and Wenlock Shale, formations typical of a large area of the county. Such plants as *Lepidium Smithii*, *Rubus Idæus*, *Sedum anglicum*, *Jasione montana*, *Scabiosa succisa*, *Campula rotundifolia*, and *Cotyledon Umbilicus*, appear to be generally associated with these formations in Denbighshire.

Leaving Eglwys Fach, I made my headquarters for the last fortnight of August at Yspytty Ifan (= "St. John's Hospital"). This remote spot is situated towards the south-western extremity of the county near the source of the River Conway and on the border line of Denbighshire and Carnarvon. Immediately around Yspytty Ifan and between here and Cerrig-y-Druidion the Silurian rocks of the Eglwys Fach area have given place to the older Ordovician System, and the change finds reflection in the topography and vegetation hereabouts. I found the details of the geology of the district somewhat difficult to follow, but the formation seems to be of the Bala type in the main. The Arenig series is also represented but to a lesser extent. Amongst noteworthy components of the flora of this area, *Trollius europæus*, *Viola lutea*, *Vicia Orobus*, *Rubus Idæus*, *Serratula tinctoria*, *Polypodium polypodioides*, and *Equisetum sylvaticum* are of frequent occurrence. *Spiræa salicifolia* and *Mimulus Langsdorffii* are thoroughly established and plentiful in places along the valley between Yspytty Ifan, Pentre Foelas, and Cerrig-y-Druidion. The lonely mountainous country in this part of Denbighshire offers botanical possibilities, and many of the remote rocky nants hereabouts should well repay attention. I regret that, owing to the limited time at my disposal and the difficult nature of the district, I had to leave several tempting spots unexplored.

Another month was spent in systematic investigation of the flora of the county in 1912. Rhyd-y-Foel (= "The Ford of the Bald Hill"), inland of Llanddulas in the north of Denbighshire, served as a centre for a fortnight in August. The carboniferous limestone is well developed in this neighbourhood, and in conjunction with the varied character of the district conduces to a rich and interesting flora. After leaving Rhyd-y-Foel, I went on to Llansannan (= "The Church of St. Sannan"), a secluded spot among the Hiraethog Hills, where I stayed for a fortnight. Surrounding Llansannan, and especially to the south, east, south-east, and south-west, there is a wild and somewhat dreary expanse of country, where habitations are few and far between, and where a stranger or tourist is rarely seen. This extensive tract of Wenlock Shale supports a rather monotonous moorland vegetation, consisting largely of *Calluna vulgaris*, *Erica cinerea*, *Vaccinium Myrtillus*, *Nardus stricta*, *Molinia cærulea*, and *Empetrum nigrum*. Here and there, but of less frequent general occurrence, are *Erica Tetralix* and *Viola lutea*. Perhaps the most interesting localities to a naturalist in such a district are the nants and lakes, which yield a pleasant variety by comparison.

In such an area as we have in mid-Denbighshire, it is hardly remarkable that old customs, traits and superstitions die hard, thanks to the absence of railways and through comparative seclusion from the outer busy world. Here one may still encounter inhabitants who are quite ignorant of a single word of English. There are little mountain farms and cottages where rush-lights are still burnt and the quaint old-fashioned rush-light-holders—*canwyll pren canwyll frwyn*—are yet employed. Notwithstanding the general adoption of the threshing machines, there are still a few inhabitants of this area who perform their threshing with a primitive arrangement known as a *ffust*, or what we should call a flail. The mowing machine is practically unknown in many of the upland farms, where the primitive scythe and sickle are still in general use for reaping.

Clematis Vitalba L. A patch on the road between Llanddulas and the sea, 1912, *F. M. T.*! South-west slope of Bryn Euryn, 1909, *Mrs. New*. Roadside hedge, Llysfaen Hill, *Russell*. Trevor Quarry, near Cefn, abundant, 1875, *Hb. Whitwell*! Trevor Rocks, 1881, *Hb. Ruddy*! Garden hedge by smithy, Bryn, between Ruabon and Erbistock, 1911, *Loftus*! Bank of Nant Tyrel, close to confluence with Dee, *ibid.* A patch on shingle between Llanddulas and Llysfaen, 1912. Close to the road just north of Glan Conway. Above the church at Llansantffraid Glan Conway. Roadside at Pentre felin, towards Llangollen.

Thalictrum minus L. Bryn Euryn, *Russell*! Limestone cliffs, Cefn-yr-Ogof.

T. flavum L. Roadside near inn, Pwllglas, near Ruthin, 1912, *J. L. H.* Several plants on hedgebank of fourth field by path between Court Farm and the Mill, Llandegla. I have not seen achenes, and so cannot tell whether variety or not, *J. M. H.* In some quantity in a hedge by the roadside just south of the police station at Eglwys Fach, 1911.

**Ranunculus circinatus* Sibth. Ditches between Tal-y-Cafn and Llanrwst, by the banks of the Conway, but on the Denbigh side of the river, *W. Hodge.* In the Dee at Llangollen, *T. Ruddy.*

R. fluitans Lam. River Clwyd, by Ruthin Prison, *J. L. H.* (*β Bachii* Wirtg.). By Melin-y-Wern, Llanbedr, *ibid.* (*β Bachii*). River Dee below Glyn Dyfrdwy.

**R. trichophyllus* Chaix. Ponds near quarry, Little Orme, *Russell.*

R. Drouetii F. Schultz. Stream at Pwllglas, near Ruthin, 1911, *J. L. H.*

**R. heterophyllus* Weber. Mill stream at Melin Gadeg Llansannan, *Hb. Wood.* Llandudno Junction, 1891 (*J. Lloyd Williams*), *Hb. Waterfall.* Llangollen, *T. Ruddy.* Pond south of Llandudno Junction, 1911, *F. M. T.*! A plant observed by Dr. Russell in the Afon Ganol, near Llangwstenin, is referred by him with some hesitation to the present species.

R. peltatus Schrank. Stream at Chirk Fish Hatcheries, 1909, *Hb. Waterfall.* Reservoir, Maes Maelor, *J. M. H.* Swampy ground, Garth-y-Groes, Llanelidan, *J. L. H.* In the Dee below Glyn Dyfrdwy. In the stream running from Llyn Aled, close to the lake.

R. Baudotii Godr. Llandudno Junction, *W. Hodge.* A plant observed by Dr. Russell near Llangwstenin is referred here by him with some doubt.

**R. Lenormandi* F. Schultz. Ditch above Pwll-y-Crochan Woods, Colwyn Bay, *Russell.* Field by Glan Aber, Derwen, *J. L. H.* Llyn-y-Chwiaid, about two miles from Llandegla, *J. L. H. & J. M. H.* Roadside one mile from Bettws Gwerfil Goch, towards Maerdy, *ibid.* Rills and plashes on Cyrn-y-Brain, *F. M. T.*! Near Bwlch Gwyn, *ibid.* Frequent about Llansannan. Bryn Trillyn. Between Pentre Foelas and Denbigh.

R. hederaceus L. Near Eglwys Fach, *W. E. Williams.* Derwen, *J. L. H.* Near Clocaenog, *J. M. H.* Llangollen, *T. Ruddy.* Roadside runnel, Dinbren, Llangollen, 1868, *Hb. Whitwell.* Between Llangollen Station and Castell Dinas Bran, *J. M. H.* Valley between Llyn Gweryd and Graig, *ibid.*; near Llansannan.

R. sceleratus L. Ditch, Llandrillo-yn-Rhos, *Russell.* Wrexham, *T. Ruddy.* Gresford, 1909, *Hb. Ruddy.* Clay pit south of Llandudno Junction, *F. M. T.*! Pulford Brook, between Lavister and the Dee, *ibid.* Foryd. Towyn.

**R. Lingua* L. Swampy ground, Garth-y-Groes, Llanelidan, 1911, *J. L. H. & J. M. H.*, sp.

R. auricomus L. Pen-y-Gardden Wood, Ruabon, *F. M. T. &*

E. H. T. Gresford Wood, *ibid.* Pwll-y-Crochan Woods, *Russell.* Lane above inn, Pwllglas, near Ruthin, *J. L. H.* Several places about Llanelidan, *ibid.* A quarter of a mile from the mill at Llandegla, *J. M. H.* Near Chirk, *Dr. J. W. Ellis*! Eyarth neighbourhood.

R. sardous Crantz. Cornfield between Llandrillo-yn-Rhos and the Golf Links, 1902, *Mrs. New.*

R. parviflorus L. Hillside, Llandrillo-yn-Rhos, *Russell.* Lane to Glan Tanat, from the Llangynog Road, Llanrhaiadr-yn-Mochnant, 1866, *Hb. Whitwell.* Hedgebank, Pen-y-Bryn, Clocaenog, *J. L. H.* By Pen-y-Coed, Pwllglas, *ibid.* Wern uchaf, Llangollen, 1906, *Hb. Ruddy.* Lane leading to Trevor Rocks, *T. Ruddy.*

Trollius europæus L. Banks of Aled, *Hb. Wood*! Side of stream near Bettws-y-Coed, *Russell.* Just above the bridge at Pont-y-Glyn Diffwys, *J. L. & J. M. H.*! Banks of Clwyd, west of Meiarth Hall, *J. L. H.*! Field opposite Sun Inn, Derwen, *ibid.* Shingle below bridge at Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.* Bank of Alwen, between Bettws Gwerfil Goch and Maerdy, *ibid.* Field at top of lane leading to Ty'n-y-Coed, Derwen, *J. L. H.* Along the Conway, between Voelas Hall and Bettws-y-Coed. Afon Cadnant, near Pentre Foelas. Frequent about Pentre Foelas. By the Aled above Llansannan and extending up to the fall at Rhydd-y-Bedd. Abundant along the banks of the Conway at Yspytty Ifan and extending for about three miles above the village. Llangwm. Banks and gorge of Afon Serw near its junction with the Conway. Plentiful along the course of the Marddwr, from Cernioge to its mouth. Afon Calettwr near Yspytty Ifan. Bank of Dee, between Rhewl and Groes lwyd.

Helleborus fœtidus L. One plant near quarry behind Abergele, *Miss C. E. Ruddy.* Wood near Llysfaen, *Russell.* Above Plas Llan, Eglwys Fach, 1910, *W. E. Williams.*

**Eranthis hyemalis* Salisb. A single plant in Manley Wood, Erbistock, 1910. Doubtless of garden origin, *H. S. Marsh.* We could find no sign of it here in 1913.

Aquilegia vulgaris L. Parsonage Wood, Gresford, 1911, *F. M. T.* Left bank of Ddulas at Llanddulas, 1911, *F. M. T. & E. H. T.* Wood at Valle Crucis Abbey, 1865, *W. Whitwell.* Slate quarry, Llansantffraid Glyn Ceiriog, 1866, *Hb. Whitwell.* Hillside above Llandudno, 1869, *H. S. Fisher.* Lane by Ty Newydd, near Llanelidan, *J. L. H.* By Bryn Ffynnon, Clawdd Newydd, *ibid.* By Coed Talwrn Farm, South-west of Nant-y-Garth, near Ruthin, *J. M. H.* On the Pentre Celyn Road from Llandegla, *ibid.* Roadside between Pen-y-Caer and Efenechtyd, *J. L. H.* Between Llanbedr and Llanfair, *J. L. H. & J. M. H.* Common in Nantclwyd neighbourhood, *J. M. H.* Wood near Graig Fechan, *J. L. H.* Frequent about Pen-y-Graig, Llanelidan, *J. L. H. & J. M. H.* Copse at Graig, Denbigh, 1912, *P. R. Foulkes Roberts & A. A. D.*

Aconitum Napellus L. Catherine Lingo Pool, Llangollen, 1907, *Hb. Ruddy.* A solitary plant by the old mill, Llwyn On, near Wrexham, *T. Ruddy.*

Berberis vulgaris L. Near Llanddulas, 1912, *F. M. T. & E. H. T.* Hedge near shop, Derwen, *J. L. H.* In a hedge at Berwyn, *T. Ruddy.* Between Clocaenog and Ruthin: the best example of an apparently wild specimen which I have seen, *J. L. H.* A single shrub in copse at Graig, Denbigh. A solitary example by Groes lwyd Farm, south of Rhewl, near Llangollen. One shrub by remains of old cottage below the New Inn, Bryn Eglwys.

Nymphæa lutea L. By the two bridges over the Pulford Brook, about two miles below Pulford, 1912, *F. M. T.*! Llyn Syberi. Llyn Serw, abundant.

**Papaver somniferum* L. Waste ground, Llangollen, *T. Ruddy.*

P. Rhœas L. Llangollen, 1866, *W. Whitwell.* Llandyn, Llangollen, 1906, *Hb. Ruddy.* Langedwyn to Llanrhaiadr, 1866, *Hb. Whitwell.* Derwen, *J. L. H.* Cornfield by Nant Morfydd, Derwen, *J. L. H.* (= β *strigosum* Boenn). Roadside between Ruthin and Denbigh Road and Llandyrnog, *J. M. H.* (β *strigosum* Boenn). Rossett. Lavister.

P. dubium L. Llangollen, *T. Ruddy*! Trevor to Llangollen, *J. M. H.* Rhewl, near Llangollen. Rossett.

P. Argemone L. Dinbren issa, Llangollen, 1909, *Hb. Ruddy.*

P. hybridum L. Cornfield behind Derwen Rectory, 1911, *J. L. H.*

**Meconopsis cambrica* Vig. Melin Gadeg, near Llansannan, *Hb. Wood.* Pont-y-glyn, *T. Ruddy.* In the gorge below the bridge at Pont-y-glyn Diffwys, 1911, *J. L. H. & J. M. H.* In some quantity in limestone crevices near Minera, 1911, *F. M. T.*!

Chelidonium majus L. Quarry behind Tan-yr-Allt, Abergele, *F. M. T.* Lane between Pen-y-Cae and Tai Nant, *F. M. T. & E. H. T.* Efenechtyd, *J. M. H.* Bwlch rhiw felin, between Llangollen and Llandegla, *ibid.* Llansannan. Nant-glyn. Eglwys Fach.

**Corydalis lutea* DC. Derwen neighbourhood, *J. L. H.* Established in crevices of walls, south-east of Llangollen. A garden escape, *Hb. Ruddy.*

C. claviculata DC. Moelfre Uchaf, *F. M. T. & E. H. T.* Coed Vron, Llansannan, *Hb. Wood.* Roadside above Bryn Tirion, Derwen, *J. L. H.* Near Bryn Ffynnon, Clawdd Newydd, *ibid.* Hill above Trevor, 1865, *W. Whitwell.* Dinbren Hall, among furze, and near the County School, Llangollen. Very local in the Llangollen area, and only seen in small amount here. Common in Merioneth, *T. Ruddy.* Llanrhaiadr-yn-Mochnant, 1864, *W. Whitwell.*

Fumaria capreolata L. Roadside hedge at Lloran, between Llanrhaiadr and Llansilin, 1866, *W. Whitwell.* Llangollen, *T. Ruddy.* Tal-y-Cafn. Near Llansannan. Denbigh. The following records refer to variety *pallidiflora* Jord:—Near Llysfaen Station, *F. M. T. & E. H. T.* Between Colwyn Bay and Llanelian-yn-Rhos, 1912, *ibid.* Penmaen Rhos, *ibid.*

F. Borœi Jord. Near Denbigh.

F. Bastardi Bor. Fields in Nant-y-Glyn, Colwyn Bay, *W. Hodge.*

F. officinalis L. Above and south of Mochdre, *Miss C. I. Thomas & E. H. T.* West slope of Great Orme, *W. Hodge.* Roadside near Graig, Eglwys Fach, *W. E. Williams.* Derwen neighbourhood, *J. L. H.* Llangollen, 1866, *W. Whitwell.* Llangedwyn, 1866, *ibid.* Near Holt, *F. M. T. & E. H. T.* Near Pulford, *F. M. T.*! Llansannan.

**Cheiranthus Cheiri* L. Valle Crucis Abbey ruins, 1864, *Hb. Whitwell.* Still occurs here. Rocks by Llanelian Church, *F. M. T. & E. H. T.* Quarry by Henllan Church, *Miss C. E. Ruddy.* Rocks by Tan-y-Graig, Graigfechan, *J. L. H.* Waste ground, station yard, Llandudno Junction, 1900, *Hb. Waterfall.* Apparently native on limestone rocks of quarry, east of Garn, Henllan, 1912, *F. M. T.*! Penmaen. The Orme.

Radicula palustris Moench. Holt Meadows, 1912, *F. M. T.* sp.

[*R. amphibia* Druce. In *Hb. Ruddy* there is a yellow flowered *Radicula* labelled "*Nasturtium amphibium.* Llwyn On Old Mill, Wrexham, 1906." The specimen is rather fragmentary, and I think the identification is open to doubt. The plant is probably either *R. sylvestris* or *R. palustris.*]

Barbarea vulgaris Ait. Quarry by Henllan Church, *Miss C. E. Ruddy.* Holt Meadows, *F. M. T. & E. H. T.* Near Plâs Lelo, Derwen, *J. L. H.* Streamside, Pwllglas, *ibid.* Llangollen, *T. Ruddy.* Acrefair, *J. M. H.* Near Llansannan. Lavister. Pulford Brook.

**B. verna* Aschers. Canal side, Llangollen, 1888, *Hb. Ruddy.*

Arabis hirsuta Scop. South of Mochdre, *Miss C. I. Thomas & E. H. T.* Wall and rocks of quarry by roadside at Garn, Henllan, *F. M. T. & E. H. T.*! Limestone quarry opposite Llandrillo Church, *W. Hodge.* Eglwyseg Rocks, Llangollen, 1866, *Hb. Whitwell*! Llanarmon, *J. M. H.*! Carrey-yr-alltydd, Llandegla, *J. L. H. & J. M. H.* Castell Dinas Bran, 1888, *Hb. Ruddy.* Eisteddfod Rocks near Minera, *F. M. T.*! Cefn-yr-Ogof.

Cardamine flexuosa With. Derwen neighbourhood, *J. L. H.*

**Alyssum maritimum* Lam. Great Orme, *Russell.* Very plentiful on rocks by Marine Drive, Llandudno, 1907, *Hb. Waterfall.*

Erophila verna E. Meyer. Wall near Hendre Aled, Llansannan, *Hb. Wood.* Rocks near Henblas, Eglwys Fach, *W. E. Williams.* Derwen, *J. L. H.* Roadside between Clawdd Newydd and Pwllglas, *ibid.* Pen-y-bryn, Llanelidan, *J. L. H.* Mochdre.

**E. prœcox* DC. Llangollen, 1866, *Hb. Whitwell.*

Cochlearia officinalis L. Great Orme, 1896, *Hb. Ruddy*! Salt marsh between Llandudno Junction and Glan Conway, *F. M. T.*!

C. danica L. West slopes of Great Orme, *W. Hodge*!

**Hesperis matronalis* L. Vicarage Woods, Eglwys Fach, *W. E. Williams.* Waste ground, Clawdd Newydd, *J. L. H.* Llangollen, 1906, *Hb. Ruddy.*

Sisymbrium Thalianum Gay. Llangollen, 1866, *W. Whitwell.*

Between Clawdd Newydd and Pwllglas, *J. L. H.* Derwen neighbourhood, *ibid.*

**S. pannonicum* Jacq. Casual at Llangollen, *T. Ruddy.*

Erysimum cheiranthoides L. Pen-y-bryn near Llangollen, *T. Ruddy.*

**Camelina sativa* Crantz. Llanddyn near Llangollen, 1909, *Hb. Ruddy.*

Subularia aquatica L. Llyn Alwen.

**Brassica oleracea* L. Abundant and luxuriant on the limestone cliffs of Cefn-yr-Ogof, between the caves and the tower, 1912.

B. Napus L. By Pulford Brook, *F. M. T.*! Ruthin. Near Llandegla. Lavister. Gresford.

B. Rapa L. Clywedog stream, Llwyn On, Wrexham, 1910, *Hb. Ruddy.*

B. nigra Koch. Riverside near Birch Hill, Llangollen, 1910, *Hb. Ruddy.* Wrexham, *T. Ruddy.* Fields, roadsides, and borders of ditches about Pensarn and Towyn.

B. alba Boiss. Laneside, Llangwstenin, 1900, *Hb. Waterfall.* Sun Halt, Llangollen. Plentiful, 1909, *Hb. Ruddy.*

**Diplotaxis muralis* DC. *β Babingtonii* Syme. Roadside just outside west entrance to the Great Orme, 1911, *W. Hodge*!

Coronopus procumbens Gileb. Casual at Ty-canol, Llangollen, 1909, *Hb. Ruddy.*

Lepidium campestre Br. Quarry, Tower Hill near Abergele, *F. M. T.* Llanfair Talhaiarn, *F. M. T. & E. H. T.* Near Cefn-byr, Llansannan, *Hb. Wood.* Hedgebank at the top of Nant-y-Glyn Road, Colwyn Bay, and also at the edge of the Golf Links, 1911, *W. Hodge* (var. *longistylum* Moore). Roadside between Llanrwst and Llanddoget, *W. E. Williams.* Gwern-ucha', Llangollen, *T. Ruddy.* Between Llanfair Talhaiarn and Llansannan. Roadside near Gyffylliog.

**Thlaspi arvense* L. Llangollen, *T. Ruddy.* The Clwt, north-east of Ruabon, 1912, *J. M. H.*

Teesdalia nudicaulis Br. Field opposite gate, Ty Cerrig, Derwen, and also roadside above Ty Cerrig, *J. L. H.* On wall in field just above Foel Grachen, Derwen, close to the last station, *ibid.* Near Valle Crucis Abbey, 1907, *Hb. Ruddy.*

Raphanus Raphanistrum L. Llangollen, *T. Ruddy.* Marchwiel, 1906, *Hb. Ruddy* (labelled *Sinapis nigra*!).

**Lunaria biennis* Moench. Near Gresford, 1911, *F. M. T. & E. H. T.*

Reseda Luteola L. Near Valle Crucis Abbey, 1865, *W. Whitwell.* Near Holt Castle, *F. M. T. & E. H. T.* Trevor Rocks, *T. Ruddy.* Acrefair, *J. M. H.*! Disused quarry at Nantclwyd, *J. L. H.* Behind and near Pen-y-coed, Graigfechan, *J. M. H.* Railway bank near Glan Conway, *F. M. T.* Railway embankment between Stansty and Wrexham, and also near Brymbo, *ibid.*!

Helianthemum Chamæcistus Mill. North of Galltfaenan, 1912, *F. M. T. & E. H. T.*! Cefn Rocks, *F. M. T.* Coed Marchon, Pwllglas, *J. L. H.* Between Efenechtyd and Ruthin, *ibid.*!

Between the old toll-bar and Plas Newydd, Llandegla, *J. M. H.* Carreg-yr-alltydd, Llandegla, *ibid.* Roadside near Capel Graig, Llanfair Dyffryn Clwyd, *J. L. H.* Eisteddfod Rocks, *F. M. T.*! Cefn-yr-Ogof. Pen-y-Corddyn Mawr. Henllan. About Graig, Denbigh. Llanarmon neighbourhood. Llandegla.

Viola palustris L. Between Llandegla and Llanelidan, *J. M. H.* Near Banciau, Derwen, *J. L. H.* Llangollen neighbourhood, *T. Ruddy.* North-east of Cyrn-y-Brain, at about 1100 ft., *F. M. T.*! Llyn Syberi. Swampy ground by Tyddyn-uchaf, south-west of Llanelian-yn-Rhos. Nant Mawr, below Pen-cae'r-cwm, above Llansannan. Banks of Conway above Pentre Foelas.

V. odorata L. Roadside near Tal-y-Cafn, *W. E. Williams.* Bodnant uchaf, Eglwys Fach, *ibid.* Derwen neighbourhood, *J. L. H.* Trevor Rocks, 1881, *Hb. Ruddy.* Llangollen, *T. Ruddy.* Coed Marchon, Pwllglas, *J. L. H.* Near Rhyd-y-Foel. Bank a little below Groes, between Denbigh and Bylchau. Roadside between Denbigh and Segrwyd. Between Denbigh and Nantglyn. Woodland between Llantysilio Hall and the Church.

V. hirta L. Gresford, *F. M. T. & E. H. T.*! Near Tyddyn-ucha, behind Abergele, *F. M. T.* Pont Newydd, near Cefn, *ibid.* Very luxuriant by roadside east of Garn, near Henllan, *F. M. T. & E. H. T.*! Near Pen-y-Graig, north-east of Llanelidan, *J. L. H. & J. M. H.* Trevor Rocks, *Hb. Ruddy*! Behind and near Pen-y-Coed, Graig Fechan, *J. M. H.* Near the mill at Llandegla, *F. M. T.*! Railway embankment between Llanddulas and Llysfaen. Roadside below Garthewin, near Llanfair Talhaiarn Bridge. Near Rossett.

V. sylvestris Kit. There are examples of a *Viola* in *Hb. Wood* from Cae Du, Llansannan, which are named *V. sylvatica.* Gresford, 1911, *F. M. T.* sp. Nant-y-Ffrith.

V. tricolor L. Near Cefn Byr, Llansannan, *Hb. Wood.* Llangollen, *T. Ruddy.* Between Pentre Celyn and Llandegla, *J. M. H.* Between Eglwys Fach and Llyn Syberi. Field near Bryn Eglwys. Quite plentiful, in company with *Alchemilla arvensis* and *Rumex Acetosella*, on a mound south-east of Bylchau Church.

V. arvensis Murr. Llangedwyn, 1866, *W. Whitwell.* Llangollen, *T. Ruddy.* The record for the present species from "Plas Newydd, Llangollen, 1876, *Hb. Jones*" (*J. B.*, Supplement, p. 12, 1911), should read "Plas Newydd, Llansilin, 1876." Near Llansannan.

V. lutea Huds. Road from Cerrig-y-Druidion to Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.* Above Pentre-llyn-cymmer, on road to Alwen Waterworks, *ibid.* Plentiful on uplands of Derwen, *J. L. H.* Lane from Llangwm Church to Pont-y-Glyn, *J. L. H. & J. M. H.* Among the short turf on the limestone common north of the Eisteddfod Rocks, Minera, *F. M. T.*! Woodland by road between Hafodunos, Llangerniew, and Foel Caledeiriau. Several places about Pentre Foelas. About Llyn Aled. Near Cefn Fforest, south-west of Bylchau. Rhos-y-Domen, between Llansannan and Gwytherin. Roadside by Hafod-y-Gog, between Llangerniew and Llansannan. Between Pandy Tudyr and Llansannan. In various places between Pentre Foelas and Cerrig-y-Druidion, and on adjoining hill-slopes. Slopes of Moel Trwyn Swch, immediately behind Moelfryn Serw and Trawsnant. Side of Garn Prys above Blaen-y-Cwm. The variety *amœna* Symons is much rarer, but I have seen it between Cefn Bryn Sion and Pont-y-Garreg Newydd, north of Gwytherin. It also occurs sparingly with the type at Hafod-y-Gog.

Polygala vulgaris L. Behind Abergele, *F. M. T.* Great Orme, *W. Hodge.* Henllan Road, from Llansannan, *Hb. Wood*! Llangollen, *T. Ruddy*! Near Ruabon, *F. M. T. & E. H. T.* Llandegla, *J. M. H.* Derwen. Yspytty Ifan. Near Llanfihangel Glyn Myfyr.

P. oxyptera Reichb. Between Efenechtyd and Ruthin, *J. L. H.*

**Saponaria officinalis* L. Banks of the Ddulas, in quantity, 1911, *F. M. T.*! Five Fords, near Wrexham, *Dr. H. Drinkwater.* Close to a garden between Esgyryn and Pydew, near Llandudno Junction.

**S. Vaccaria* L. Llwyn On, near Wrexham. Has occurred here near the stream in some quantity for several years in succession, *Dr. H. Drinkwater.* There is a specimen from here in *Hb. Ruddy.*

Silene maritima With. Between Llanddulas and Pensarn.

**S. anglica* L. Llandudno district, *Prof. R. W. Phillips.* Llangollen, 1910, *T. Ruddy.* Cornfield near Derwen, 1911, *J. L. H.* sp.

Lychnis Githago Scop. Wrexham, *T. Ruddy.* Cornfield by Bryn Meilron, Derwen, *J. L. H.*

Cerastium semidecandrum L. Llangollen, *T. Ruddy.* A plant which Mr. J. L. Harmann observed on the roadside opposite Llyn Cyfynwy in 1911 is referred by him with some doubt to the present species. I have seen no specimens.

Moenchia erecta Gaertn. Castell Dinas Brân and Valle Crucis Abbey, 1888, *Hb. Ruddy.*

Stellaria aquatica Scop. Right bank of Alyn, opposite Gresford Station, *J. M. H.*

**S. neglecta* Weihe. Roadside between Clawdd Newydd and Pwllglas, *J. L. H.*

S. uliginosa Murr. Moel-y-Faen, near Llangollen, 1875, *Hb. Whitwell.* Near Clocaenog, *J. M. H.* Between Cerrig-y-Druidion and Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.* Between Llangollen and Llandegla, *J. M. H.* Near Gresford.

Arenaria serpyllifolia L. Near Holt, *F. M. T. & E. H. T.* Derwen, *J. L. H.* Llangedwyn, 1866, *W. Whitwell.* Cliff at Colomendy, near Mold, 1869, *W. Whitwell.* Roadside, Ffrith Agored, Clocaenog, *J. L. H.* Near Glyndyfrdwy, *J. M. H.* Between Acrefair and Trevor, *ibid.* Near Plas Einion, Llanfair Dyffryn Clwyd, *ibid.*

A. peploides L. Stone embankment between Llandudno Junction and Glan Conway, *F. M. T.*! Towyn, *ibid.*

Sagina apetala Ard. Llangollen, *T. Ruddy.*

S. procumbens L. Llangollen, 1866, *W. Whitwell.* Between Llandegla and Rhydtalog, *J. M. H.*

S. nodosa Fenzl. Between Llandegla and Rhydtalog, *J. M. H.*

Spergula arvensis L. Gresford, *F. M. T.*

Spergularia rubra Pers. By the Holyhead Road near Cernioge. Near Cefn Brith, near Cerrig-y-Druidion. Roadside near Rhyd lydan.

S. salina Presl. Salt marsh between Llandudno Junction and Glan Conway, *F. M. T.*!

[*Tamarix gallica* L. Llandudno; planted, *Miss C. E. Ruddy*!]

Hypericum Androsæmum L. Left side of lane after crossing stream about half a mile above and south of Mochdre, *Miss C. I. Thomas.* Ty Nant, near Llansilin (before 1865), *Miss E. F. Jones.* Near Nantglyn, *Hb. Wood.* Near Glyn Mawr, Derwen, *J. L. H.* Bank of shingle sloping from canal to high road between Trevor and Llangollen, *J. M. H.* Hedgebank near Plas Lelo, Derwen, *J. L. H.* A few plants by roadside south of Eglwys Fach.

**H. calycinum* L. Abundant about the summer-house overlooking the river, north of Gallt Faenan, *F. M. T. & E. H. T.*! No doubt originally planted. Occurs as a shrubbery plant by the roadside half a mile north of Bodnant, near Eglwys Fach.

H. maculatum Crantz. Llansilin, 1872 (*Miss E. F. Jones*), *Hb. Whitwell.* Between Llandegla and Llanelidan, *J. M. H.* Half a mile west of Dinmael, *J. L. H. & J. M. H.* Efenechtyd, *J. M. H.* Tyn Twll, south-east of Nantglyn, *J. M. H.* Border of wood, Graig Fechan, *ibid.* Near Nantclwyd, *J. L. H. & J. M. H.*

H. quadrangulum L. Llanddulas, *F. M. T.*! The Clwt, north-east of Ruabon, *J. M. H.* Thicket near Llysfaen Station, *Russell* sp. Above and south of Mochdre, *Miss C. I. Thomas & E. H. T.* Near Trefnant, *ibid.* East of Glan Aber, Derwen, *J. L. H.* Llangollen, *Hb. Ruddy.* Lane near Llangwm Church, *J. L. H. & J. M. H.* Chirk, 1866, *W. Whitwell.* Roadside between Bont Uchel and Gyffylliog, *J. M. H.* Between Ruabon and Pen-y-Cae, *ibid.* Llanarmon and near Glyndyfrdwy, *ibid.* South of Rhyd-y-Foel. Railway embankment between Llanddulas and Llysfaen Station.

H. pulchrum L. Near Bryngwynallt, Abergele, *F. M. T.*! Wood at Valle Crucis Abbey, 1865, *W. Whitwell.* Penmaen Rhos, *F. M. T. & E. H. T.* Hendre Aled, *Hb. Wood*! Derwen, *J. L. H.* Near top of Llysfaen Old Village, *Dr. F. D. Thomas & E. H. T.* Near Henllan, *J. M. H.* Llanfihangel Glyn Myfyr, *ibid.* Chirk, 1866, *W. Whitwell.* Llansilin, 1867, *Hb. Jones.* Roadside between Llanrhaiadr and Pistyll Rhaiadr, 1864, *Hb. Whitwell.* Still occurs here. Between Llanelidan and Corwen, *J. L. H. & J. M. H.* Road between Maerdy and Cerrig-y-Druidion, *ibid.* Near Glyndyfrdwy, *J. M. H.*! The Clwt, north-east of Ruabon, *ibid.* Conway Valley, *F. M. T.*! Near Eglwys Fach. About Llansannan. Pentre Foelas.

H. hirsutum L. Thicket near Llysfaen Station, *Russell* sp. Wood on slope of Elwy between Cefn Caves and Pont Newydd, *J. M. H.* Lane near Tyddyn ucha', Llanelidan, *J. L. H.* Llangollen, *T. Ruddy.* By Eyarth Hall, *J. L. H. & J. M. H.* Trevor Rocks, *Hb. Ruddy*! Near summit of road between Pentre Celyn and Llandegla, *J. M. H.* Graig Fechan, *J. L. H. & J. M. H.* East of farm called Bryn Ffanigl isaf, between Rhyd-y-Foel and Bettws-yn-Rhos.

H. montanum L. Llanelian-yn-Rhos, *F. M. T.* Near Bryngwynallt, Abergele, *ibid.*! Great Orme, *Hb. Ruddy*! Wood on slope of Elwy between Cefn Caves and Pont Newydd, *J. M. H.* Between Tan-y-craigiau and Rhos isaf, near Llandegla, *ibid.* Behind and near Pen-y-Coed, Graig fechan, *ibid.* Near Denbigh. Llanarmon.

H. elodes L. Llyn Du, Llansannan, *Hb. Wood.* Bog almost south of Gwyndir, south-west of Llanelidan, 1911, *J. L. H. & J. M. H.* Nant-y-Garth, *J. M. H.* Near Pont-y-Glyn, *T. Ruddy.* Boggy ground near Llyn Syberi. Pools south-east of Llyn Syberi. Swampy ground by stream to west of road and Rhaiadr Fawr, 1912.

Malva sylvestris L. Holt Castle, *F. M. T.* sp. Llansilin, 1867, *Hb. Jones.* Erbistock, *Rev. W. W. Mason.* Common on seashore, Rhos, *Russell.* Llangollen, 1866, *W. Whitwell.* Trevor to Llangollen, *J. M. H.* Llandudno Junction, *F. M. T.*! Glan Conway, Graig. Near Eglwys Fach. Llanelian-yn-Rhos. Rhewl, near Llangollen.

M. rotundifolia L. Between Llangedwyn and Llanhaiadr-yn-Mochnant, 1866, *W. Whitwell.* Llangollen, 1866, *ibid.* Seen once near Llangollen, *T. Ruddy.* Near Nantglyn, *Hb. Wood.* By gate, Pen-y-Bryn, Llanelidan, *J. L. H.* Near Glan Conway. Deganwy. Llandudno Junction. Rhyd-y-Foel. Llysfaen.

M. moschata L. Llanfair Talhaiarn, *F. M. T. & E. H. T.* Between Bont Uchel and Gyffylliog, *J. M. H.* Glan Tanat-ucha', Llanrhaiadr-yn-Mochnant, 1866, *W. Whitwell.* Near Glyndyfrdwy, *J. M. H.*! Wood by roadside near Dinmael, *J. L. H. & J. M. H.* Llangollen, 1866, *W. Whitwell*! Pen-y-Graig, near Llanelidan, *J. L. H. & J. M. H.* Between Llanbedr and Llanfair, *ibid.* Between Llanarmon and Pentre Coch, *J. M. H.* Near Llandyrnog, *ibid.* Llandegla neighbourhood, *F. M. T.*! Mochdre. Near Wern, Llangerniew. Near Llantysilio.

**Tilia vulgaris* Hayne. Dyffryn Aled, *Hb. Wood*! By bridge near the Crown Inn, Llandegla. This is the only station I know in the neighbourhood, *J. M. H.*

**T. cordata* Mill. Limestone rocks in woodland north of Galltfaenan, 1912, *F. M. T. & E. H. T.*! Clearly native here and associated with *Pyrus torminalis*, *Euonymus*, and *Ligustrum.* A small tree seen by the roadside between Capel Garmon and Bettws-y-Coed. I noticed an odd shrub in 1912 in the copse close to and east of Garth Gogol, near Rhyd-y-Foel; this appeared quite native, and *Ligustrum* and *Euonymus* were also seen near by. Several small trees in the first wood by the Conway, above Yspytty Ifan. Hedgerow by lane a quarter of a mile east of Plas Jolyn, just before coming to a small cottage. A single example seen in a hedgerow by the road north-west of Ruthin. Two large trees by junction of Chester and Ellesmere Canal and the Dee at Llantysilio. Several examples seen between Rhewl and Glyn Dyfrdwy. A hedgerow shrub in steep lane leading from the Conquering Hero Inn, Llantysilio, to Moel-y-Gaer.

**Linum angustifolium* Huds. Llangollen, *T. Ruddy.*

**L. usitatissimum* L. Field at Llanddulas, *F. M. T.* Valle Crucis Abbey, 1870, *W. Whitwell.* Casual at Llangollen, *T. Ruddy.*

Geranium sanguineum L. Limestone rocks in woodland north of Galltfaenan, 1912, *F. M. T. & E. H. T.*! Rocks by roadside, Pwllglas, near Ruthin, *J. L. H.* Eglwyseg Rocks, *Hb. Ruddy.* The Roft, Marford.

**G. phæum* L. Ruthin Castle, 1909 (*Miss C. E. Ruddy*) *Hb. Ruddy.* Near right bank of Alyn between Marford and Gresford, after turning up on left at bridge, 1911, *J. M. H.* Small field below Nantglyn Church and adjoining the road, 1912. There are some cottages close by.

G. pratense L. Eyarth, 1872, *Hb. Ruddy.* In the valley south-east of Llangollen, very sparingly, *T. Ruddy.* By the roadside between Llandegla and Pen-y-bryn, *F. M. T.*! Plentiful in several places—and especially Coed Llys Wood—near Llandegla, *J. M. H.*!

G. pyrenaicum Burm. fil. Roadside about a mile from Denbigh Asylum, towards Llanrhaiadr, 1912 *J. M. H.* Road leading to Llandyrnog from Ruthin and Denbigh Road, *ibid.* Field near Valle Crucis Abbey, 1865, *Hb. Whitwell.* Near Marl Hall, near Llandudno. Llantysilio.

G. pusillum L. Near Trefnant, *Miss C. I. Thomas & E. H. T.* Llyfaen Rocks, 1912, *F. M. T.*!

G. dissectum L. Near Pont Newydd, Cefn, *F. M. T.* Llangollen, *T. Ruddy.* Near Llanfair, *J. L. H.* Between Llangedwyn and Llanrhaiadr-yn-Mochnant, 1866, *W. Whitwell.* Plentiful along Pulford Brook below Lavister, and elsewhere in the neighbourhood, *F. M. T.*! Eglwys Fach—an odd plant.

G. columbinum L. Near Abergele, *F. M. T.* sp. Gresford, towards Marford Hill, 1869, *Hb. Whitwell.* In quantity between Llanarmon and the Stag Inn, *J. M. H.* Chirk Station, 1875, *W. Whitwell.* Bank at Tyno Rocks, Llandegla, *J. M. H.* Near smithy at Graigfechan, *ibid.* Between Efenechtyd and Ruthin, *J. L. H.* Railway embankment, Nantclwyd Station, *ibid.* Lady Bagot's Drive, *J. M. H.* Roadside opposite Denbigh Station, *ibid.* Between Bron Derwen and Tyddyn isaf, Derwen, *J. L. H.* By quarry, Pwllglas, *ibid.*

G. lucidum L. Laneside south of and above Mochdre, *Miss C. I. Thomas & E. H. T.* By Rhuallt, Efenechtyd, *J. L. H.* Pen-y-graig, near Llanelidan, *J. L. H. & J. M. H.* Near Capel Rhiw, Llanelidan, *ibid.* Road leading from Denbigh and Ruthin Road to Llandyrnog, *J. M. H.* Between Llangedwyn and Llanrhaiadr, 1866, *W. Whitwell.* Walls by roadside between Dinas Hill and Voelas Hall.

Erodium cicutarium L'Hérit. Wood close by the church at Cefn, *R. H. Day.* Roadside near the Golf Links near Llangollen, *T. Ruddy.* Behind Nantclwyd Station, *J. L. H.* Tyno Rocks, Llandegla, *J. M. H.* In quantity below Llysfaen Rocks.

**E. moschatum* L'Hérit. Llandudno neighbourhood, *Prof. R. W. Phillips.*

**Impatiens Noli-tangere* L. Llyn Catherine Lingo, Llangollen, 1906, *Hb. Ruddy.*

Euonymus europæus L. In a little spinney turning down to Pont Newydd, Cefn, *F. M. T.* Wood between Tower Hill and Abergele, *ibid.*! Eyarth Woods, associated with *Cornus*, *J. L. H.* Quarry near Pen-y-graig, north-east of Llanelidan, *J. L. H. & J. M. H.* Frequent about Llangollen, *T. Ruddy.* Above and below Plas Newydd, near Llandegla, *J. M. H.* Wood overhanging Tan-y-Creigiau fields, by Tyno, Llandegla, *J. M. H.* Graig Fechan, *J. L. H. & J. M. H.* Hedge by Tyn twll Farm, Llanfair, *ibid.* Rocky ledges near the summit of Bryn Euryn, *W. Hodge.* Along Afon Meirchion, Henllan, *J. M. H.* Denbigh Road [from Llansannan], *Hb. Wood.* Between Ruthin and Clocaenog, *J. M. H.* Limestone rocks and ledges of Pen-y-Corddyn Mawr, near Rhyd-y-Foel. Limestone cliffs, Cefn-yr-Ogof. Between Eglwys Fach and Tal-y-Cafn. Between Glan Conway and Pentre felin. Woodland north of Gallt Faenan. Hedgerow of road above Pen Craig Fawr, Llansannan. Several shrubs in hedgerow east of road in ascent from Llansannan towards Llanfair Talhaiarn, just above Plas-yn-Cornel. A single shrub north-east of Dyffryn Aled, Llansannan. Composing a hedge (along with *Prunus Padus*) by the road just above Finger, towards Bryn Mawr, between Llansannan and Groes. Near Llantysilio. Skirting a ditch on west side of wood below Graig, near Pen-y-llan, and close to the Dee. Woods along Dee Valley in several places between Erbistock and Nant-y-Belan.

Rhamnus catharticus L. Behind Abergele, *Miss C. E. Ruddy*! Several shrubs in small copse by footpath north-east of Graig Farm, near Denbigh, 1912, *F. M. T. & E. H. T.*! Limestone rocks in woodland north of Galltfaenan, *ibid.*! Roadside by wood, one and a quarter miles from Denbigh, towards Henllan, 1912, *J. M. H.* Between Pentre Celyn and Llandegla, *ibid.* Hedges near St. George, *Russell.* A single shrub in the hedge by road near Maes Maelor, on the old Llandegla Road, *F. M. T.*! In several places for two miles along the road from Llandegla towards Wrexham, *ibid.*!

**Staphylea pinnata* L. Valle Crucis Abbey, 1906, *Hb. Ruddy.*

Acer campestre L. Lane south of and above Mochdre, *Miss C. I. Thomas & E. H. T.* Nant-y-growen, Llansannan, *Hb. Wood.* Pen-y-Cae, near Ruabon, *F. M. T. & E. H. T.*! Hedge near Glan Aber, Derwen, *J. L. H.* Between Llanelidan and Corwen, *J. L. H. & J. M. H.* Between Pentre Celyn and Llandegla, *J. M. H.* Road above Bryn Ffynnon, near Nantclwyd, *J. L. H. & J. M. H.* Near Capel Rhiw, Llanelidan, *ibid.* Ty'n llwyn, near Nant-y-Garth, *J. M. H.* Graig Fechan, *J. L. H. & J. M. H.* Between Maes Maelor and Llandegla, *F. M. T. & A. A. D.* Frequent about Llandegla, *ibid.*! Lavister, *ibid.*! Erbistock. Near Pont-y-Trap, between Denbigh and Cefn. Woodland between Plas isaf and Plas Newydd, Llansannan. Bryn Eglwys. Llantysilio. Trevor.

Genista anglica L. Llandudno neighbourhood, *Prof. R. W. Phillips*. On the bogland south-west of and close to Plas Jolyn, near Pentre Foelas, 1911. These plants appeared to be infected with a micro-fungus which attacked the leaves. This may perhaps have been *Uromyces appendiculata* Lev. Heath between the two tumuli at Rhos-y-Domen between Llansannan and Gwytherin, 1912.

G. tinctoria L. Railway bank by Trefnant Station, 1911, *F. M. T. & E. H. T.* Between Brook Street Halt and Ponkey Halt, Rhos Llanerchrugog, 1912, *ibid.* Hedgebank near Little Orme, 1907, *Hb. Waterfall.* A small patch on roadside bank near Cefn-isaf, south-west of Rhyd-y-Foel.

Cytisus scoparius Link. Llanelian-yn-Rhos, *F. M. T.* Pant-y-cefn, Llansannan, *Hb. Wood.* Pant Brickfields, near Llanerchrugog, *F. M. T. & E. H. T.* Llangollen, *W. Whitwell.* Gresford, *F. M. T. & E. H. T.* Derwen neighbourhood, *J. L. H.* High road between Llangwm and Cerrig-y-Druidion, *J. L. H. & J. M. H.* Roadside between Llandegla and Llanelidan, *J. M. H.* Meadows close to Holt Castle, *F. M. T. & E. H. T.* Near Llandegla, *F. M. T.*! Hillside below Bryn Mawr, between Groes and Llansannan. Acrefair. Near Llantysilio.

Ononis repens L. Derwen, *J. L. H.* Roadside near Pwllglas, *J. M. H.* Common about Llangollen, *T. Ruddy.* Near Llandegla, *J. M. H.* Near Nantclwyd Hall, *J. L. H. & J. M. H.* Above Coed Ial Farm, Glyndyfrdwy, *J. M. H.* Trevor to Llangollen, *ibid.* A few plants by roadside half a mile east of Pont Deunant. —Var. *horrida* Lange. Very fine and quite erect on bank of lane south of Borth wryd Farm and close to the smithy, near Rhyd-y-Foel. Railway bank and shore about Llysfaen.

**Medicago sativa* L. Near Towyn, *F. M. T.*! Railway banks at Wrexham, cultivated, *T. Ruddy.*

**M. denticulata* Willd. β *apiculata* Willd. Has occurred as a casual at Llangollen, *T. Ruddy.*

**Melilotus altissima* Thuill. Tan-y-Castell, Llangollen, 1907, *Hb. Ruddy.* In some quantity amongst clover on Plas-onn Farm, east of Rhyd-y-Foel, 1912.

**M. alba* Desf. Side of a new road at Llandrillo-yn-Rhos, towards Colwyn, 1909, *Mrs. New.* Near Valle Crucis Abbey, 1906. *Hb. Ruddy.* Wrexham, *ibid.*

**M. indica* All. Llangollen, 1906, *Hb. Ruddy.* Near King's Mills, Wrexham, *T. Ruddy.*

Trifolium medium L. Ruabon, *J. M. H.* Canal side at Llangollen, *T. Ruddy.* Clay bank by shore between Old Colwyn and Penmaen. Between Llanddulas and Llysfaen. Bryn Eglwys. Eisteddfod Rocks.

**T. incarnatum* L. A single plant by the roadside about six miles from Wrexham and west of Bwlch Gwyn, 1911, *F. M. T. & A. A. D.* Field by Nant Morfydd, Derwen, 1912, *J. L. H.*

T. striatum L. Roadside above Pen-y-Coed, Pwllglas, *J. L. H.* Eyarth Rocks, *ibid.*

**T. scabrum* L. On inland bank of sea wall, where the road from Rhos leads into footpath to Little Orme, 1902, *Mrs. New.*

**T. hybridum* L. High road between Llangwm and Cerrig-y-Druidion, *J. L. H. & J. M. H.* Llandyn, Llangollen, 1906, with proliferous heads, *Hb. Ruddy.*

T. fragiferum L. Field by shore at Pensarn, *F. M. T.*!

T. dubium Sibth. Between Llanrhaiadr and Llangedwyn, 1866, *W. Whitwell.* Between Denbigh and Henllan, *J. M. H.* Llanelidan, *ibid.* Llangollen, *Hb. Ruddy.*

T. filiforme L. Gwern ucha', Llangollen, 1906, *Hb. Ruddy.* Roadside above Pen-y-Coed, Pwllglas, *J. L. H.* Canal bank at Llangollen, *C. Waterfall.*

Anthyllis Vulneraria L. Roadside between Hope and Gresford, between Apothecaries' Hall and Five Crosses, 1912, *Mrs. Phillips.* About Llansantffraid Glan Conway, *F. M. T.*! Marford.

Astragalus glycyphyllos L. Bronheulog, Llangollen, 1906, *Hb. Ruddy.* In two places along the base of the Trevor Rocks, 1911, *Dr. H. Drinkwater*!

Ornithopus perpusillus L. Tan Tryfan [near Pont Deunant, Llansannan], *Hb. Wood.* Derwen neighbourhood, *J. L. H.* Common about Dinas Bran, *T. Ruddy.*

Vicia hirsuta Gray. Rhos Llanerchrugog, *F. M. T. & E. H. T.* Llangollen, *T. Ruddy.* Between Trevor and Llangollen, *J. M. H.* Roadside about a mile and a half from Denbigh, towards Bylchau. Roadside bank between Nantglyn and Denbigh.

V. tetrasperma Moench. Above Mochdre, *Miss C. I. Thomas & E. H. T.* By the cross-roads about half a mile from Trefnant towards St. Asaph, *ibid.* Near Derwen, *J. L. H.* Near Drylliau, Clocaenog, *ibid.* By path between Eyarth Station and Llanfair, 1912, *ibid.* Near the railway about half a mile or so above Glan Conway Station on a wooded eminence between the river and the railway, *F. M. T.*! Lane by Towyn Church, *ibid.*! Near the Hospital at Foryd.

V. Orobus DC. River bank below Pentre Llyn-cymer, above Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.* By Hafod-y-llan, about three miles north of Cerrig-y-Druidion, at 1250 ft., *ibid.* About Pentre Foelas and along the valley to Cerrig-y-Druidion. Plentiful about Yspytty Ifan, and extends along the Conway for about three miles above the village. Between Glasfryn and Cefn-brith.

V. angustifolia L. Near Pont Fadog, Ceiriog Valley, 1863, *W. Whitwell.* Llangedwyn, 1866, *ibid.* Dinas Bran, Llangollen, 1909, *Hb. Ruddy.* Nantglyn. Between Denbigh and Bylchau.

**Lathyrus Aphaca* L. Rossett, 1912, *Miss Millett.* Wrexham (casual), *Dr. H. Drinkwater.*

**L. Nissolia* L. Wilderness, near Wrexham, *Dr. H. Drinkwater.*

Prunus insititia L. Trefnant, *F. M. T. & E. H. T.* Gresford, *ibid.*

P. Padus L. Roadside near Gyffylliog, *J. L. H.* Roadside between Bettws Gwerfil Goch and Maerdy, *J. L. H. & J. M. H.* Bersham, *Dr. H. Drinkwater.* Near Bwlch Gwyn, *J. M. H.*! A bush in hedge by roadside about ten miles from Wrexham towards Ruthin, *F. M. T.*! By the Afon Gwrysgog, close to Glan Conway. One shrub on rocks at Rhaiadr Fawr, north of Llyn Aled. Near Tan-y-Fron, Llansannan. Skirting the road for a mile or so south-east of Rhyd Llanfair, between Pentre Foelas and Bettws-y-Coed. Derwen neighbourhood. Llangwm. Dinmael. About Yspytty Ifan. Between Pont Moelfre and Rhyd dolwen.

**Spiræa salicifolia* L. Plentiful about the Afon Medrad, below Llangwm, *J. L. H. & J. M. H.* Near Nebo. Between Pentre Foelas and Nebo. Banks of the Marddwr, near Pentre Foelas. Hedgerow below Hafod las, near Yspytty Ifan. Near Capel Garmon. Above Pont Moelfre. Garden hedge by roadside below the New Inn, Bryn Eglwys. About Yspytty Ifan.

**Rubus suberectus* Anders. A bramble which I believe to be this species is plentiful by the Conway at Yspytty Ifan.

R. macrophyllus Wh. & N. var. *Schlechtendalii* Wh. & N. On the path leading to Bryn-y-maen, at the foot of the Bramble Mountain, Colwyn Bay, *W. Hodge.*

**R. radula* Weihe var. *echinatoides* Rogers. On the path by the stream above the Mountain View Hotel, Mochdre, *W. Hodge.*

R. dumetorum Wh. & N. var. *diversifolius* Lindl. Railway bank by bridge under railway and adjoining road leading to the "Roft" at Marford, *C. Waterfall* (named by Rev. W. M. Rogers)! Near Ruabon.—Var. *britannicus* W. Moyle Rogers. Pwll-y-Crochan Woods, *W. Hodge.*

**R. Balfourianus* Blox. Rocky places, Bryn Euryn, 1911, *W. Hodge.*

R. saxatilis L. Eglwyseg Rocks, *T. Ruddy.* About half a dozen plants on rocks in Ceunant, close to Rhaiadr Fawr, 1911 and 1912. A few plants also seen lower down in 1912.

Geum rivale L. Meadow below Parsonage Wood, Gresford, 1911, *F. M. T. & E. H. T.* Banks of Aled, Llansannan, *Hb. Wood*! Side of brook, near Wern, Eglwys Fach, *W. E. Williams.* Banks of Alwen, Llanfihangel Glyn Myfyr, *J. L. H.* Langollen, *T. Ruddy.* Near the Tyno at Llandegla, *J. M. H.* Near Bod Idris, Llandegla, *ibid.* Second field from the 'Raven,' Llandegla, *J. M. H.* By the Alyn north of Llandegla, *F. M. T.*! Ceunant. Rocks by Rhaiadr Fawr (Rhyd-y-Bedd). Nant Mawr, below Pen Cae'r Cwm, about five miles east of Gwytherin, 1912. By the Conway, between Bettws-y-Coed and Voelas Hall. By the Conway Falls. Melin Gadeg, Llansannan. Gorge of the Conway about three miles Yspytty Ifan. In the steep ravine of the Afon Serw, north-east of Trwyn Swch.

G. rivale L. × *G. urbanum* L. (*G. intermedium*). Near Bryn Mill, Llansannan, *Hb. Wood.* Roadside between the bridge, Bryn Eglwys, and Tal-y-Bidwell, 1911, *J. L. H.* sp.

Potentilla palustris Scop. Left side of river below Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.* Near Tan-yr-ywen, Eglwys Fach, *W. E. Williams.* By Hafod-y-llan, about three miles north of Cerrig-y-Druidion, *J. L. H. & J. M. H.* Marsh in Plas Newydd field, Llandegla, *J. M. H.* Bog above Gwindir, south-west of Llanelidan, *J. L. H. & J. M. H.* Llyn Syberi. Llyn Aled. Llyn Alwen. Llyn-y-Foel Frech. Swampy ground near the two tumuli between Gwytherin and Llansannan. Llyn Ddau-ychain. Llyn Serw. Bog north-west of Plas Jolyn, near Pentre Foelas.

Agrimonia odorata Mill. In the lane leading to Blackberry Mountain, Nant-y-glyn, Colwyn Bay, *W. Hodge.* Between Denbigh and Henllan, *J. M. H.* Between Ruthin and Clocaenog and also across the river from Gyffylliog Church, *ibid.* Roadside above Cae Haidd, Llanelidan, *J. L. H. & J. M. H.* sp. Field below Caerddinan, Llanelidan, *J. M. H.* Ffordd Tyn Celyn, Llanelidan, *ibid.*

Poterium Sanguisorba L. Near the top of Llysfaen village, *Dr. F. D. Thomas & E. H. T.* Cefn Rocks, *F. M. T. & E. H. T.*! Roadside, Pwllglas, *J. L. H.* Eglwyseg Rocks, *T. Ruddy.* Road from Rhos-ddigre to Ty-newydd, Llandegla, *J. M. H.* Rock overhanging lete a quarter of a mile from the mill at Llandegla, *ibid.* Rocks, Graigfechan, *J. L. H.* Eisteddfod Rocks, *F. M. T.*! Marford. Limestone rocks south of Llysfaen. Pen-y-Corddyn Mawr. Cefn-yr-Ogof.

**P. officinale* A. Gray. Meadows on the south side of Pulford Brook, between Lavister and the Dee, 1912, *F. M. T.*!

Rosa spinosissima L. Nant-y-Plwm [Llansannan], *Hb. Wood.* Graig, near Denbigh, and between Denbigh and Henllan, *F. M. T. & E. H. T.*! River bank below Pentre llyn cymmer, *J. L. H. & J. M. H.* Llandegla, *W. Hodge*! By Cefn ffordd, above Dafarn dwyrch, near Llandegla, *J. M. H.* Pen-llain-wen, between Pentre celyn and Llandegla, *ibid.* Roadside near Pentre Foelas. Llysfaen. Nant Mawr, below Pen Cae'r-Cwm, about one and a half miles north of Bryn Trillyn.

**R. Eglanteria* Huds. Wood between Pont Llys and Pont-y-Gynnan, Derwen, *J. L. H.* Carreg-yr-alltydd, Llandegla, *J. M. H.*

**Pyrus torminalis* Ehrh. Queried in Top. Bot. Catherine Lingo Pool, Llangollen, 1911, *Hb. Ruddy.* Two trees opposite Efel Rhewl, Llanelidan, 1911, *J. L. H.* Limestone rocks in woodland north of Galltfaenan, 1912, *F. M. T. & E. H. T.*!

P. Aria Ehrh. *β rupicola.* Limestone rocks, Pen-y-Corddyn Mawr, near Rhyd-y-Foel. Cefn-yr-Ogof. Llysfaen Rocks.

**Cratægus Oxyacantha* L. Seen between Llangollen and Glyn Ceiriog some years ago, but I forget the precise station.

**Cotoneaster microphylla.* Hedgebank, Pabo Hill, 1900, *Hb. Waterfall.* In quantity by a wall near a quarry by the roadside, a little south of Gwrych, 1910, *R. H. Day.* Three plants in turf at Trevor Rocks, *T. Ruddy.* Is quite naturalized in several places on the limestone cliffs of Cefn-yr-Ogof, between the caves and the tower.

Saxifraga tridactylites L. Wall near Hendre Aled, Llansannan, *Hb. Wood.* Wall by Mountain View Hotel, Mochdre, *W. Hodge.* Wall, Henblas, Eglwys Fach, *W. E. Williams.* Wall, Plas-yn-Llan, Efenechtyd, *J. L. H.* A very leafy form plentiful in crevices of rocky side of Dee above the bridge, Llangollen, near the Town Hall, 1866, *Hb. Whitwell.* Llanelidan churchyard wall, *J. L. H.* Wall by Rectory, Llandegla, *W. Hodge.* Plas Newydd Farm, Llanarmon, *ibid.* Eisteddfod Rocks, *F. M. T.*! Cefn-yr-Ogof. Llysfaen.

S. granulata L. Plentiful in Gresford churchyard, 1910, *J. Southworth.* By the Alyn, north of Llandegla, *F. M. T.*!

S. hypnoides L. Gorge of the Iwrch, Llanrhaiadr, 1863, *W. Whitwell.*

Chrysosplenium alternifolium L. Bryn Coch Dingle, near Rhyd-y-Croesau, 1864, *Miss E. F. Jones.* In several places in the Llangollen neighbourhood, *T. Ruddy.* Llandyn, near Llangollen, 1906, *Hb. Ruddy.* Roadside ditch by Dinbren Hall, near Llangollen, *Dr. J. W. Ellis.* Gresford, *Dr. H. Drinkwater.* Close to the Dee, immediately south of Graig, near Erbistock, *G. Loftus*! Nant-y-Belan.

Ribes alpinum L. Hedge near Trevor Rocks, *T. Ruddy.*

**R. rubrum* L. Llangollen, *T. Ruddy.* Hedgerow near Rhyd Llanfair, between Bettws-y-Coed and Pentre Foelas. Bridge over Afon Ystrad, north of Segrwyd, near Denbigh.

Cotyledon Umbilicus-Veneris L. Nantglyn Road [from Llansannan], *Hb. Wood*! By the "Flagstaff," Colwyn Bay, *W. Hodge.* Llangollen, *T. Ruddy.* Mardy, *J. L. H. & J. M. H.* Rocks near Valle Crucis Abbey, *J. M. H.* Capel Garmon. Nant Mawr, about a mile and a half from Bryn Trillyn. Walls of Rectory at Llanfair Talhaiarn. Neighbourhood of Yspytty Ifan. Rocks by Bryn Kenrick, near Llanfair Talhaiarn.

Sedum Telephium L. Along high road from Llangwm to Cerrig-y-Druidion, *J. L. H. & J. M. H.* Roadside near Derwen School, *J. L. H.* Very common on the Tyno Rocks, Llandegla, *J. M. H.* Eglwys Fach. Banks of lane below Pen Craig Fawr, Llansannan. By the sawmill north of Segrwyd, near Denbigh.

**S. purpureum* Tausch. Near Rhydy Foel, *F. M. T. & E. H. T.* Llanelian-yn-Rhos, *ibid.* By the church at Llanfair Talhaiarn, 1911, *E. H. T.* sp. Cottage garden wall north of Eglwys Bach. Roadside one and a half miles east of Dolgarrog, close to schools. By the roadside below Pen-y-Gob, about a mile and a half west of Llangwm.

**S. album* L. Wall by roadside between Pensarn and Towyn, *F. M. T.*! Wall by Mountain View Hotel, Mochdre, *W. Hodge.* Wall by farm by roadside about half a mile south-west of Pentre felin, Llansantffraid Glan Conway. Wall by Post Office, Llanelian-yn-Rhos. Wall of Llangerniew churchyard.

S. anglicum Huds. Llanarmon Dyffryn Ceiriog, 1866, *W. Whitwell.* High road from Llangwm to Cerrig-y-Druidion, *J. L. H. & J. M. H.* Roadside above Ty Cerrig, Derwen, *J. L. H.* Roadside, Bryn Ffynnon, Clawdd Newydd, *ibid.* On rocks by the river above Glan Conway Station, *F. M. T.*! Near Bodnant and Pentre felin. Between Groes and Pont Deunant. Near Tyddyn uchaf, Llansannan. Frequent in the Llansannan area. Yspytty Ifan neighbourhood. Cribin Oernant, on slate.

***S. reflexum* L. Quarry by Henllan Church, *Miss C. Ruddy.* Glyn Farm, near Colwyn Bay, *F. M. T. & E. H. T.* Embankment, Nantclwyd Station, *J. L. H.* Old walls of ruined buildings near the farmhouse at the foot of the gorge on the south side of the Geraint, Llangollen, 1864, *W. Whitwell.* Bridge above Craig Fechan, *J. L. H. & J. M. H.* Llanelidan, *J. L. H.* Bettws-yn-Rhos. Llanelian-yn-Rhos. Farm wall near Llanddoget. Wall at Grugfryn, south-west of Llanelian-yn-Rhos. In quantity on wall of ruined cottage by roadside above Cefn Isaf, near Bettws-yn-Rhos. Groesffordd, near Mochdre. Bank by ruined cottage about a mile west of Groes, near Denbigh. Wall at Tan-y-Fron, near Llansannan. On a pigstye at Ddollwen, Llangerniew. Roadside banks south-east of Llannefydd, in some quantity. By old farm called Pentre du above Llanfair Talhaiarn.

**Sempervivum tectorum* L. Near St. George, *F. M. T.* Ty fy-nain Farm, Llanferres, *J. Southworth.* Wall by shop, Clawdd Newydd, *J. L. H.* Rhewl fawr, Derwen, *ibid.*

Drosera rotundifolia L. Moors near Hendre Aled, *Hb. Wood.* Marsh above Glan Aber, Derwen, *J. L. H.* To the right of the road between Llandegla and Rhydtalog, *J. M. H.*! Moel-y-Gamelin, *T. Ruddy.* Bog near Llyn Gweryd, *J. M. H.* Llyn-y-Chwiaid, about two miles from Llandegla, *J. L. H. & J. M. H.* At top of Oernant, between Llangollen and Llandegla, *J. M. H.* To left of road by Waenwen, between Llandegla and Llanelidan, *ibid.* Damp ground on Moelfre uchaf, *F. M. T.*! Swamp near Llyn Syberi. Near Llyn Aled and Llyn Alwen and in many places in the surrounding district. Marshy ground between the road and Cefn-y-gadfa, north-west of Pentre Foelas. Frequent both north and south of the road between Pentre Foelas and Denbigh. About Llyn Serw. Near Llyn Bran. Frequent in bogland in valley between Pentre Foelas and Cerrig-y-Druidion, and on adjoining hills. Slope of Garn Prys.

**Myriophyllum spicatum* L. Canal at Llangollen, *T. Ruddy.* By engineering works at Acrefair, *J. M. H.* Llyn Gweryd. Canal at Chirk.

**M. alterniflorum* DC. Mill-stream near the Aled, *Hb. Wood.*

Peplis Portula L. Pond near Lletty, Llansannan, *Hb. Wood.* Bog below "Whalley's Folly," Trevor, 1875, *W. Whitwell.* Pit by Bryn Rhedyn above Rhôs lydan, 1911, *J. M. H.* Ditch between two tumuli between Gwytherin and Llansannan.

Lythrum Salicaria L. Rhuddlan Marsh, *F. M. T.* Meadows by the Dee at Holt, *F. M. T. & E. H. T.* By the Alyn between Marford and Gresford, *J. M. H.* By the Clywedog near Llanrhaiadr, *ibid.*

Epilobium angustifolium L. King's Mills, Wrexham, 1906, *T. Ruddy* sp. Acrefair, *J. M. H.* Wood by Bryn Clwyd, Nantclwyd, *J. L. H.* A garden weed by the school west of Groes, 1911. Roadside by the Police Station at Pentre Foelas; doubtless of garden origin. Near Ruabon.

E parviflorum Schreb. Llangollen, *T. Ruddy.* Wood near Nant-yr-hendy, Llanelidan, *J. L. H.* Swamp near Llanelidan

J. L. H. & J. M. H. Acrefair, *J. M. H.* Eglwyseg Rocks, 1866, *Hb. Whitwell.* Near Llanarmon, *J. M. H.* Between Graigfechan and Llandegla, *ibid.* Canal side between Cysyllte and Chirk, 1865, *W. Whitwell.* Near Plas Einion, Llanfair, *J. M. H.* Between Rhyd-y-Foel and Bettws-yn-Rhos. Ceunant.

E. roseum Schreb. By the mill below Rhyd-y-Foel.

**E. tetragonum* Curt. Llangollen, *T. Ruddy.* Llanfihangel Glyn Myfyr, *J. L. H.*

E. palustre L. Marsh in Plas newydd field, Llandegla, *J. M. H.* Llangollen, *T. Ruddy.* Llanfihangel Glyn Myfyr, *J. L. H.* Bog above Gwndir, south-west of Llanelidan, *J. L. H. & J. M. H.*

**Œnothera biennis* L. Eastern bank of the Conway by Llandudno Junction, 1911, *Russell.* Several plants growing on railway ballast by Wrexham Station, 1911.

Bryonia dioica Jacq. Pentre felin, Llangollen, *Hb. Ruddy.*

Conium maculatum L. By Thunder Cottage, inland of Abergele, *F. M. T.* Near ford on Aled [Llansannan], *Hb. Wood.* Trefnant, *F. M. T. & E. H. T.*! By Ty ucha Farm, Little Orme, *W. Hodge.* Near Ty'n coed, Derwen, *J. L. H.* Efenechtyd, *J. M. H.* Railway bank at Sun Halt, near Llangollen. *T. Ruddy.* By Pen-y-coed, Pwllglas, *J. L. H.* Rhewl [near Ruthin], *J. M. H.* By farm near bridge at Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.* About Pulford Brook, between Lavister and the Dee, *F. M. T.*! Near Marl. Esgyryn. Bank at Denbigh end of bridge at Tal-y-Cafn. A garden weed at Capel Garmon. Bank by Groes lwyd Farm near Rhewl, near Llangollen.

Smyrnium Olusatrum L. Penmaen Rhos, *F. M. T. & E. H. T.* Bryn Howel, Trevor, *T. Ruddy.* About a farm above and east of Eglwys Fach. Roadside near Esgyryn. By Borth wryd, south of Rhyd-y-Foel.

**Bupleurum rotundifolium* L. Rossett and Wrexham, *Dr. H. Drinkwater.*

Apium inundatum Reichb. fil. Llyn Syberi.

**Carum Petroselinum* Koch. Quarry by Henllan Church, *Miss C. Ruddy.* Llangollen, 1906, *Hb. Ruddy.* On rocks in a quarry near Esgyryn.

Sison Amomum L. A single plant only seen between Pentre felin and Hendre waelod, near Llansantffraid Glan Conway, 1911. Roadside between Galltfaenan and Pen Ucha'r Green, at 300 ft.

Myrrhis Odorata Scop. Seen somewhere on Creuddyn Peninsula in 1900, but station not remembered, *Mrs. New.* River-bank below Pen-y-gardden, near Ruabon, *F. M. T. & E. H. T.* Nant-y-growen, Llansannan, *Hb. Wood.* Pont-y-Capel, Gresford, *Dr. H. Drinkwater.* Rhostyllen, *J. Southworth.* Roadside on way to Cerrig-y-Druidion from Maerdy, *J. L. H. & J. M. H.* By Hafod-y-llan, about three miles north of Cerrig-y-Druidion, *ibid.* Roadside one mile from Bettws Gwerfil Goch, towards Maerdy, *ibid.* Field by Pyllan, Derwen, *J. L. H.* By Tai Teg, Derwen, *ibid.* Several places about Llangollen, *T. Ruddy.* Plentiful by Coed Talwrn Farm, south-west of Nant-y-Garth, 1911, *J. M. H.* Roadside bank opposite Court, a little over ten miles from

Wrexham, towards Ruthin, *F. M. T.*! An odd plant near Nantglyn, 1912.

Scandix Pecten-Veneris L. Roadside near Glyn Mawr, Derwen, *J. L. H.* Ruthin, *T. Ruddy.* Cornfield by Pant-y-Gynnau, Derwen, 1912, *J. L. H.*

**Fœniculum vulgare* Mill. Roadside rocks near Llysfaen Station and side of high road above, *F. M. T.* By Borth wryd, south of Rhyd-y-Foel.

Œnanthe fistulosa L. Ditches about Towyn and elsewhere on Morfa Rhuddlan, *F. M. T.*!

Œ. Lachenalii C. Gmel. Towyn.

Æthusa Cynapium L. Acton Lane, Wrexham, *Dr. H. Drinkwater.* Roadside between Bettws Gwerfil Goch and Maerdy, *J. L. H. & J. M. H.* Llangollen, *T. Ruddy.* Derwen district, *J. L. H.* A weed in grounds of Denbigh Castle.

Silaus flavescens Bernh. Nant-y-Glyn Road, Colwyn Bay, *F. M. T.* A patch by roadside south of Kinmel Park, at 450 ft. Roadside between Gallt Faenan and Pen Ucha'r Green, at 300 ft.

**Peucedanum Ostruthium* Koch. Close to an old ruined cottage by the roadside near Bryn-yr-Esgob, near Nebo, 1911. Probably a relic of cultivation, as it was growing in company with *Lamium maculatum.* Two large patches were seen by Mr. G. Loftus and myself in 1912 on a mound in enclosure by stream at north end Llyn Aled. Here also it was probably a relic of former cultivation, as I believe a house formerly existed on this site. *Symphoricarpos racemosus* was growing close by. Alt. circa 1220 ft.

Caucalis nodosa Scop. Penmaen Rhos, *F. M. T. & E. H. T.* Trevor Rocks, 1906, *Hb. Ruddy*! Waste ground by Plas Einion, Llanfair, *J. M. H.* Llangollen neighbourhood, *T. Ruddy.*

Cornus sanguinea L. Hedges ¼ mile from St. George, *F. M. T.* Lane by Minffordd, Derwen, *J. L. H.* Eyarth Woods, *ibid.* Between Llanbedr and Llanfair, *J. L. H. & J. M. H.* Trevor Rocks, 1881, *Hb. Ruddy*! Hedges at Bradley, near Gresford, *F. M. T.* Top of hill above Gas Works, Nant Clwyd, *J. L. H.* Roadside for two miles from Llandegla, towards Wrexham, *F. M. T.*! Rhyd-y-Foel. Near Llandegla. Copse south of Ffrith.

Sambucus Ebulus L. Banks of Alwen, Llanfihangel Glyn Myfyr, *J. L. H.* Nant-yr-Hendre, Llanelidan, *J. M. H.* Roadside near Holt, *Dr. H. Drinkwater.*

**S. nigra* var. *laciniata* Mill. A shrub in an inaccessible position on Llysfaen Rocks, 1912, *F. M. T. & E. H. T.*! A single tree also on rocky hillside a little to the north of previous station. First noted by Dr. Thomas in 1911.

Viburnum Opulus L. Llai, near Pont-y-Capel, under the railway bridge, *F. M. T.* Bank of Alyn between Marford and Gresford, *J. M. H.* Llangollen, *T. Ruddy.* By the River Ddulas, near Llanddulas, *R. H. Day.* Hendre Aled, Llansannan, *Hb. Wood.* Pen-y-Cae, *F. M. T. & E. H. T.* By Pen-y-Gaer, Pwllglas, *J. L. H.* Pant Brickfields, Rhos Llanerchrugog, *F. M. T. & E. H. T.* Near Pentre Celyn, *J. M. H.* Roadside near Llidiart Sais, Llanelidan, *J. L. H.* Roadside east of Llandegla, towards Wrexham, *F. M. T.*! Roadside between Glan Conway and the Penmachno Road. On rocks below Rhaiadr Fawr, Llansannan, at about 1100 ft. An odd shrub between Groes and Bryn Mawr. Near Llangwm. By the Conway near Pennant, above Yspytty Ifan. Hedgerow by roadside north-east of Bryn Eglwys. Several places about Llandegla. Near Ruabon.

Rubia peregrina L. On limestone south of Abergele, *F. M. T.*! Cefn-yr-Ogof. Pen-y-Corddyn Mawr. East side of Llysfaen Rocks, somewhat sparingly.

Galium verum L. Near Derwen, *J. L. H.* Coed Marchon, *J. M. H.* By high road between Llangwm and Cerrig-y-Druidion, *J. L. H. & J. M. H.* Above Pentre Llyn Cymmer, going towards the water works, *ibid.* Trevor, 1865, *W. Whitwell*! Carreg-yr-alltydd, Llandegla, *J. M. H.* South-west of Bwlch Gwyn, *F. M. T.*! Eisteddfod Rocks, *ibid.*! Between Llansannan and Groes. Roadside west of Pentre Foelas. On the Denbigh road, above Pentre Foelas. Denbigh Castle Hill. Bryn Eglwys.

**G. erectum* Huds. Copperas, near Pen-y-Cae, May 16th, 1912, *Miss F. M. & Dr. E. J. H. Thomas* sp.! (confirmed by Mr. Arthur Bennett).

**G. Mollugo* L. Dingle near Colwyn Bay, *W. Hodge.* Gresford, *J. M. H.*

G. palustre L. Near Llanfair Talhaiarn, *F. M. T. & E. H. T.* Derwen, *J. L. H.* Nant-y-garth, *J. M. H.* Bog above Gwndir, *ibid.* Marsh in Plas Newydd field, Llandegla, *J. M. H.* Ditches between road and railway, south-west of Mochdre. Near Bettws-y-Coed. Between Pentre Foelas and Cerrig-y-Druidion.—*Var. *Witheringii* Sm. Holt Meadows, *F. M. T.* sp.

Asperula odorata L. In a lane called Ffordd las mawr, at the foot of Moelfre, *F. M. T.* Nant-y-Plwm, Llansannan, *Hb. Wood.* Nant-y-Glyn, *F. M. T.* Above Mochdre, *Miss C. I. Thomas & E. H. T.* Pen-y-Gardden Wood, near Ruabon, *F. M. T. & E. H. T.* Gorge at Pont-y-Glyn Diffwys, *J. L. H. & J. M. H.* Near Llanbedr, *ibid.* Efenechtyd, *J. M. H.* North of Glyndyfrdwy, *J. L. H. & J. M. H.* Llangedwyn, *W. Whitwell.* Llandegla neighbourhood, *F. M. T.*! Eisteddfod Rocks, *ibid.* Eglwys Bach. Near Bettws-y-Coed. Near Bodchwil, Llanfair Talhaiarn and Trevor.

Sherardia arvensis L. Behind Abergele, *F. M. T.* Fields between Denbigh and Henllan, *F. M. T. & E. H. T.*! Bradley, near Gresford, *F. M. T.* Near Cefn Caves, *J. M. H.* Derwen, *J. L. H.* Llangollen, *T. Ruddy.* Llanfair, *J. M. H.* North of Glyndyfrdwy, *ibid.* Near Pentre Foelas. Between Denbigh and Nantglyn.

Valeriana dioica L. Derwen, *J. L. H.* Bog, Tan-y-Castell, Llangollen, *T. Ruddy.* Field between Llandegla and Llangollen, *J. M. H.* Canal-side, Llangollen, *T. Ruddy.* By the Tyno, Llandegla, *J. M. H.* Near Gresford, *J. Southworth.* Llwyn On, near Wrexham, *T. Ruddy.* Near Rhewl between Llantysilio and Glyndyfrdwy. Ditch near Bryn Eglwys.

**Kentranthus ruber* DC. Along the railway west of Llandudno

Junction, especially plentiful on the Conway Bridge. Wall by the Conway, below Victoria Hotel, Llanrwst. Ruins of Denbigh Castle.

Valerianella olitoria DC. Roadside by gasworks, Nantclwyd, *J. L. H.* Llangollen, *T. Ruddy* Roadside between Llanfair and Ruthin, *J. L. H.* Near Capel Garmon.

**V. rimosa* Bast. Pabo Hill, July, 1900, *Hb. Waterfall.*

V. dentata Poll. Field by Valle Crucis Abbey, 1865, *W. Whitwell.* Derwen, *J. L. H.* Rhewl, near Ruthin, *J. M. H.* Below Pen-y-Coed, Pwllglas, *J. L. H.* Near Llansantffraid, Glan Conway. Rhewl, near Llangollen.

Dipsacus sylvestris Huds. West slopes of Great Orme, *W. Hodge.* Near Llandudno.

D. pilosus L. Trevor Rocks, 1906, *Hb. Ruddy*! Sun Halt, near Llangollen, *T. Ruddy.* Skirting ditch on west side of wood below Graig, near Pen-y-llan, and close to the Dee, *G. Loftus*!

Scabiosa Columbaria L. Cefn Rocks, *J. M. H.* Dinas Bran, *T. Ruddy.* Eisteddfod Rocks, *F. M. T. & A. A. D.* Cefn-yr-Ogof. Rhyd-y-Foel. Pen-y-Corddyn Mawr.

S. arvensis L. Llandrillo-yn-Rhos, 1868, *Hb. Harris.* Llangollen, 1866, *W. Whitwell.* Llansilin, 1867, *Hb. Jones.* Bettws-yn-Rhos, *J. J. Ogle.* Slaty moorlands above Colwyn Bay, *Russell.* Llysfaen and Llanddulas, *F. M T.*! Near Cefn Byr, Llansannan, *Hb. Wood*! Derwen, *J. L. H.* Dinmael and Graig fechan, *J. L. H. & J. M. H.* Efenechtyd, *J. M. H.* Very common round Llandegla, *W. Hodge*! Between Abergele and Tower Hill, *F. M. T.* Near Nantclwyd, *J. L. H. & J. M. H.* Ruabon to Pen-y-Cae, *J. M. H.* Acrefair to Trevor, *J. M. H.* Llanarmon, *ibid.* Eglwys Bach. Llansannan. Gwytherin. Denbigh. Near Bylchau. By railway between Llanrhaiadr and Rhewl. Gyffylliog. Clocaenog. Llanbedr. Near Glyndyfrdwy. Llanrhaiadr-yr-Mochnant. Tanat Valley.

Eupatorium cannabinum L. Behind Abergele, *F. M. T.*! By the mill below Henllan, *J. M. H.* Dinmael, *J. L. H. & J. M. H.* Roadside, Pwllglas, *J. L. H.*! Near Llanrhaiadr, *J. M. H.*! Trevor Rocks, *T. Ruddy*! Between Llanbedr and Llanfair, *J. L. H. & J. M. H.* Ditch opposite Eyarth Station, *J. L. H.* Nant-y-Garth, *J. M. H.*! Nant-y-bryn du, Llanelidan, *ibid.* Craig-y-Glyn, Llanrhaiadr-yn-Mochnant, *T. Ruddy*! Valley of the Iwrch, near Llanrhaiadr, 1864, *Hb. Whitwell*! By the Ddulas above Llanddulas. Road between Llandudno Junction and Mochdre Station. Damp ground near the Fairy Glen, Bettws-y-Coed.

Erigeron acre L. East of Nantclwyd Station, *J. L. H. & J. M. H.* Trevor Rocks, *Hb. Ruddy*! Cefn-yr-Ogof.

Filago germanica L. Vivod, near Llangollen, 1868, *Hb. Whitwell.* Waste rough ground off Bodfari Road, about 1½ miles from Caerwys, with *F. minima, Mrs. New.* Above Mochdre, *Miss C. I. Thomas & E. H. T.* Roadside, Llysfaen Rocks, *F. M. T. & E. H. T.*! Eyarth Rocks, *J. L. H.*

F. minima Fr. Abbey Hill and Wern Uchaf, Llangollen, *T. Ruddy.*

Antennaria dioica Gaertn. Bwlch-y-Ddaer, about 1¼ miles west of Llechryddan; before 1865, *Miss E. F. Jones.* Eglwyseg Rocks, *T. Ruddy.* Behind Cefn-y-Coed, Graig Fechan, *J. M. H.*

**Inula Helenium* L. Banks of Alwen, near Llanfihangel Glyn Myfyr, *J. L. H.* Ty Du, Llangollen, *Hb. Ruddy.* A large patch on steep bank by canal, about a mile from Llangollen, towards Pentre Felin.

I. squarrosa Bernh. Pensarn shore, *F. M. T.*! Between Efenechtyd and Ruthin, *J. L. H.* Hill above River Ystrad, between Llanrhaiadr and Denbigh, *J. M. H.*! Near Graig-isa', Llanelidan, *J. L. H.* Llandudno Junction to Glan Conway. Cefn-yr-Ogof.

Pulicaria dysenterica Gray. Between Trefnant and St. Asaph, *Miss C. I. Thomas & E. H. T.* Near Ruabon, *F. M. T. & E. H. T.* Llanrhaiadr, *J. M. H.*! Between Ruthin and Llanbedr, and between Graig fechan and Llandegla, *J. M. H.* Ditches near Llangwstenin. Near St. George. Between Bettws-yn-Rhos and St. Asaph. Near Rhyd-y-Foel.

Bidens tripartita L. Between road and railway between Tal-y-Cafn and Maenan.

Anthemis arvensis L. Llangollen, *T. Ruddy.*

Chrysanthemum segetum L. Nantglyn road [from Llansannan], *Hb. Wood.* Near Llangollen, an odd plant only, *T. Ruddy.* Derwen, *J. L. H.* Cornfields about Moelfre uchaf, *F. M. T.*! Fields near Eglwys Fach. Between Eglwys Fach and Llyn Syberi. Capel Garmon. Gwytherin. Fields between Pentre Foelas and Nebo. Near Bettws-y-Coed. Yspytty Ifan. Cefn Brith.

C. Parthenium Bernh. Below Crow Castle, with very small ray florets, 1875, *W. Whitwell.* Near Garth gynan, Llanfair, *J. M. H.* By the canal between Llangollen and Llantysilio. Pentre felin.

**Matricaria suaveolens* Buch. Acrefair, 1912, *J. M. H.* The Cambrian Station at Wrexham, July, 1907; waste ground by G.W.R. railway-bridge, Wrexham, July, 1909, *Hb. Ruddy.*

Tanacetum vulgare L. Lane below Moelfre, *F. M. T.* Above foot-bridge over the Alwen above Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.* Near Llangollen, *T. Ruddy.* Bron Heulog, Pen-y-Cae, *F. M. T. & E. H. T.* Field between Rhewl bach and Clawdd Newydd, *J. L. H.* In quantity near river below Holt, *F. M. T. & E. H. T.* Field adjoining Derwen School, *J. L. H.* Banks of Clwyd between Eyarth and Ruthin, *ibid.* Corner of field near Pont styllod, Llandegla, *J. M. H.* By Tyn-y-Groesffordd; Llanbedr, *J. L. H.* Laneside near brickworks below Llandudno Junction, *F. M. T.*! Along bank of Pulford Brook, between Lavister and the Dee, *F. M. T.*! Above road between Colwyn Bay and Old Colwyn. About Bettws-yn-Rhos. Hedgerow just above the inn at Tal-y-Cafn. Near Bryn-y-gwynt, Eglwys Fach. Between Eglwys Fach and Llanelian-yn-Rhos. Bank by a farm called Ynys Wen, south-east of Yspytty Ifan—probably originally planted. By cottage between Rhyd lydan and Garn Prys, near

Pentre Foelas. Garden hedge by roadside below the New Inn, Bryn Eglwys.

Artemisia Absinthium L. Between Cefn Caves and Pont Newydd, *F. M. T.* Quarry by Henllan Chapel, *Miss C. Ruddy.* Llangedwyn, 1866, *Hb. Whitwell.* About a farm, ½ mile north-east of Llandegla, *F. M. T.*! About Ty-mawr, near Eglwys Fach and other farms. Below Llansantffraid Glan Conway. Frequent about farms in Llansannan neighbourhood. By farm south of Llanfihangel Glyn Myfyr.

**A. maritima* L. About bend of Conway Estuary above Llansantffraid Glan Conway, 1911.

**Petasites fragrans* Presl. Top of wall, Strut-y-Rhos, Ruthin, *J. M. H.* Churchyard at Llansantffraid Glan Conway.

**P. albus* Gaertn. Abundant on both sides of mill-race at Pentre Felin (New Mill) Eglwys Fach, 1911. No doubt originally from an adjoining garden. Mr. J. R. Hughes, of Eglwys Fach, informs me that it has grown here for many years.

Senecio sylvaticus L. Between Trefnant and Pont Newydd, *F. M. T.* Near Pont-y-llys, Derwen, *J. L. H.* Waste rough ground off Bodfari Road, 1½ miles from Caerwys, *Mrs. New.* Holt Castle, *F. M. T.* sp. Llangollen neighbourhood, *T. Ruddy.* Between Llangollen Station and Dinas Brân, *J. M. H.* Between Ruabon and Pen-y-Cae, *ibid.* Moelfre uchaf, *F. M. T.*! Mynydd Bodrochwyn. Bank by Conway, between Tal-y-Cafn and Llansantffraid. Between Eglwys Fach and Llanddoget. About Moelfre isaf and lanes and roadsides inland of Abergele. Moel Trwysog. Gallt-y-Foel, near Bettws-y-Coed. Gwytherin. On rocks in cutting east of Acrefair Station.

**S. squalidus* L. Plentiful on railway banks between Stansty and Brymbo, *F. M. T.*! By engineering works, Acrefair, *J. M. H.*!

**S. erucifolius* L. Lane at foot of Moelfre, *F. M. T.* Old mill at Llwyn On, Wrexham, 1906, *Hb. Ruddy.* Between Llanddulas and Llysfaen. Llandudno Junction. Llangwstenin. Colwyn Bay. Near Pabo. South of Rhyd-y-Foel. Frequent in valley between Denbigh and St. Asaph.

Carlina vulgaris L. East of Nantclwyd Station and Graig Fechan, *J. L. H. & J. M. H.* Eisteddfod Rocks, *F. M. T.*! Pen-y-Corddyn Mawr.

Carduus pycnocephalus L. β *tenuiflorus* Curt. Pen-y-Corddyn Mawr. Llysfaen. Cefn-yr-Ogof.

C. nutans L. Roadside between Hope and Gresford, *Mrs. Phillips.* About Tower Hill, Abergele, *F. M. T.*! By Rhewl Station, *J. M. H.*! Path above Coed Marchon, *ibid.* Graig Fechan, *J. L. H. & J. M. H.* Above Coed Ial Farm, Glyndyfrdwy, and near Nantclwyd Station, *J. M. H.* Efenechtyd.

C. crispus L. Wrexham, *T. Ruddy.* Roadside by Rhewl-bach, Derwen; field below Llanbedr towards Ruthin, *J. L. H.* Near Eyarth Station, *J. M. H.* Llangollen. Efenechtyd. Trevor.

**Cnicus heterophyllus* Willd. Small quarry by roadside near Craig-y-llwyn gwgan at county boundary on way from Bala to Cerrig-y-Druidion, *T. Ruddy.* Abundant at Llandegla, *J. M. H.*

**Onopordum Acanthium* L. Queried in Top. Bot. A number of large plants by a farm in lane leading to shore at Towyn, 1912, *F. M. T.*!

**Silybum Marinum* Gaertn. Roadside between Hope and Gresford, *Mrs. Phillips.* Trevor Rocks, 1906, *Hb. Ruddy.* In some quantity about foot of limestone rocks south of Llysfaen and just above Plas Newydd.

Serratula tinctoria L. Common in the Alwen Valley above Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.*! Among furze by Bryn Dreiniog, Derwen, *J. L. H.* Roadside bank near lodge of Kinmel Park, about a mile west of Glascoed. By Conway, near Foelas Hall. Roadside above Glasfryn, going towards Cefn Brith. Plentiful on bank of Conway by foot-bridge immediately above Coed Hafod las above Yspytty Ifan. Gorge of Conway just below the confluence with the Afon Serw. Sparingly on steep banks of the Afon Serw, below Trwyn Swch.

Centaurea Scabiosa L. Quarry at Henllan Church, *Miss C. Ruddy.* Near Llanfair Talhaiarn, *F. M. T. & E. H. T.* Near Exchange Station, Wrexham, *F. M. T.* Bryn Euryn, *W. Hodge.* Path above Coed Marchon, *J. M. H.* Between Efenechtyd and Ruthin, *J. L. H.* Railway bank, Gresford, *J. M. H.*! Llysfaen.

C. Cyanus L. Field near Valle Crucis Abbey, 1865, *Hb. Whitwell.* Wrexham, *T. Ruddy.* Railway embankment between Derwen and Nantclwyd, *J. L. H.*

Cichorium Intybus L. Abundant in 1912 in lane on left of Trefnant to Bodfari Road, *Miss C. Ruddy.* Field on Pentre Farm, Derwen, *J. L. H.* Near Crow Castle, Llangollen, 1910, *J. Southworth.* Llangollen, 1864, *Hb. Whitwell.* Eyarth, 1872, *Hb. Ruddy.* Cornfield between Bryn-ffynnon and Eyarth Hall, 1911, *J. L. H. & J. M. H.* Waste land by Plas Einion, Llanfair, *J. M. H.* New Broughton, near Wrexham, *Dr. H. Drinkwater.* Llwyn On, near Wrexham, *T. Ruddy.*

Picris echioides L. Casual at Llanddyn, near Llangollen, *T. Ruddy.* Llangollen, 1906, *Hb. Ruddy.* A few plants near Llandudno Junction.

**Crepis taraxacifolia* Thuill. Naturalized on waste land near railway at Wrexham Station, *Hb. Ruddy.*

C. paludosa Moench. Wrexham neighbourhood, *T. Ruddy.* Below Bryn Tirion, Derwen, *J. L. H.* By the Tyno, Llandegla, *J. M. H.* Wood between Pont Llys and Llys, Derwen, *J. L. H.* Stream above inn at Llangwm, *J. L. H. & J. M. H.* Pont-y-Glyn Diffwys, *ibid.* Swamp in Plas Newydd field, Llandegla, *J. M. H.* Nant Mawr, below Pen Cae'r Cwm, about 1½ miles north of Bryn Trillyn. Banks of Conway, Yspytty Ifan. Marddwr. Llanfihangel Glyn Myfyr. Rhewl, near Llantysilio. Banks of Dee, especially where wooded, between Llangollen and Glyndyfrdwy.

**Hieracium aurantiacum* L. King's Mills, Wrexham: a garden escape on railway side, 1907, *Hb. Ruddy.*

**H. umbellatum* L. var. *coronopifolium* Fr. Foot of Little Orme, near the sea, *W. Hodge.*

**H. rubicundum* F. J. Hanb. Limestone rocks of Great Orme, 1892 (*J. Lloyd Williams*), *Hb. Waterfall.*

**H. stenolepis* Lindeb. Limestone rocks of Great Orme, 1909, *Hb. Waterfall.*

Leontodon nudicaule Banks & Sol. Great Orme, 1907, *Hb. Waterfall.* Derwen, *J. L. H.*

L. hispidum L. Nantclwyd, *J. M. H.* Llanrhaiadr-yn-Mochnant, 1866, *Whitwell.* Carreg-yr-alltydd, Llandegla, near Llanarmon, and field below Llanbedr, *J. M. H.*

**Taraxacum erythrospermum* Andrz. Wall, Rossett, *C. Waterfall.* Roadside by Derwen School, *J. L. H.* Shore near Pensarn.

**Lactuca virosa* L. Rocks near pier at Llandudno, *F. M. T.*! Limestone cliffs of Pen-y-Corddyn Mawr.

Tragopogon minus Mill. Henllan, *Miss C. Ruddy.* Gresford, *F. M. T.* Chirk, *T. Ruddy.* Llangollen, 1888, *Hb. Ruddy.* Graig fechan and Derwen neighbourhood, *J. L. H.* Llandudno Junction, *F. M. T.*! Denbigh Castle Hill.

Lobelia Dortmanna L. Llyn Alwen.

Jasione montana L. Llanfihangel Glyn Myfyr, *F. M. T.* Eglwyseg Rocks, 1865, *Whitwell*! Llangollen, *T. Ruddy.* Llangwm, *J. L. H.* Woods near Llanrhaiadr-yn-Mochnant, 1866—remarkably large, *Whitwell.* Roadside between Pont Fadog and Llansantffraid Glyn Ceiriog, 1863, *Whitwell*! Banks, Pentre Saeson Station, *F. M. T.*! Clocaenog. Yspytty Ifan. Pentre Foelas. Bwlch Gwyn. Slopes of Llantysilio Mountain.

**Wahlenbergia hederacea* Reichb. Queried in Top. Bot. By Dee between Berwyn and Llangollen, *Miss E. M. Wood.* Moelfre uchaf, *F. M. T.*! Berwyn, *T. Ruddy.* Llyn Gweryd to Ruthin Road, *J. M. H.* Nant-y-Gollen, near Eglwys Fach. Fairy Glen, Bettws-y-Coed.

Campanula Trachelium L. Lady Bagot's Drive, *J. M. H.* Lane leading to Coed Marchon, Pwllglas, *J. L. H.* About Pen-y-Graig, near Nant Clwyd, *J. L. H.* Near Llandegla, *J. M. H.* Pistyllgwyn, Llanfair D. C., *J. L. H.*

C. latifolia L. By mill below Henllan, *J. M. H.* Banks of Clwyd opposite Pont-y-gynau, Derwen, *J. L. H.* Carreg-yr-alltydd, Llandegla; by Melin-y-Wern, Llanbedr; and Plas-yr-Esgob, Llanelidan, *J. L. H.* Eyarth Bridge, near Ruthin, 1872, *Hb. Ruddy.* About Pen-y-graig, near Nant Clwyd, *J. M. H.* Bont Uchel. Copse by road from Ffrith to Cefn-y-Bedd.

Vaccinium Vitis-Idæa L. Moel-y-Gamelin, *T. Ruddy.*

Oxycoccus quadripetala Gilib. Llyn-y-Chwiaid, 2 miles from Llandegla, *J. M. H.* Banks of Clwyd below Ffordd Cambwll, Derwen, *J. L. H.* Near Llyn Syberi. Near Cefn-y-gadfa, by road from Pentre Foelas to Denbigh. Between Cerrig-y-Druidion and Pentre Foelas.

Primula veris L. Field going up to Bryn Alyn, Gresford, *F. M. T.* Derwen neighbourhood, *J. L. H.* At about 1500 ft. in field at Bryn Trillyn. About Denbigh. Erbistock.

**Lysimachia vulgaris* L. Llantysilio Bog, *T. Ruddy.* By Conway, S.E. of Rhyd Llanfair. Plentiful along the Marddwr.

L. Nummularia L. Road from Colwyn Bay to Llandrillo-yn-Rhos, 1912, and by Dee below Holt, *F. M. T.* River side, Llwyn On Old Mill, near Wrexham, *Hb. Ruddy.* Prynela Wood, south of Nant-y-Belan tower, *G. Loftus*!

Anagallis arvensis L. Nant-y-Glyn, *F. M. T.* Derwen, *J. L. H.* Llangollen, *T. Ruddy.* Llanelidan, *J. M. H.* Roadside near Pentre Foelas. Roadside near Cernioge.

**A. fœmina* Mill. Cae boncyn, Derwen, *J. L. H.*

A. tenella Murr. Beyond tunnel, Llysfaen, *Ogle.* Bank of Clwyd below Foel Grachen, Derwen, and field adjoining Llys, Derwen, *J. L. H.* Nant-y-Garth, and bog above Gwndir, *J. M. H.* Near Clocaenog, *J. L. H.* Ruthin Road at top of Oernant, and by Llyn Gweryd to Ruthin Road, *J. M. H.* By Afon Aled below Rhaiadr Fawr (Rhyd-y-Bedd). By Conway, 3 miles above Yspytty Ifan. Llantysilio Mountain.

Ligustrum vulgare L. Limestone rocks behind Abergele, and in woodland north of Gallt Faenan, *F. M. T.*! Pen-y-Corddyn Mawr. Cefn-yr-Ogof. Woodland near Dee above Erbistock.

**Vinca major* L. Lane above Thunder Cottage, near Abergele; quarry near Bryngwynallt, Abergele; and side of stream, Llanddulas, *F. M. T.* Roadside between Llandudno Junction and Mochdre Station.

**V. minor* L. River side by Offa's Dyke, near Ruabon, 1912, *F. M. T.* North bank of river, east of Llangollen, *T. Ruddy.* Lower end of Nant-y-Glyn, *E. H. T.*

Blackstonia perfoliata Huds. Near Pont Newydd, Cefn, *F. M. T.* Trevor Rocks. Lanes inland of Abergele. Clay bank by shore between Old Colwyn and Pen Maen.

Centaurium umbellatum Gilib. South of Abergele, *F. M. T.* Llysfaen, *E. H. T.*! Between Trefnant and St. Asaph, *E. H. T.*! Near Henllan, *J. M. H.* Derwen, *J. L. H.* Near Ruthin; Trevor to Llangollen; and near Glyn Dyfrdwy, *J. M. H.* Trevor Rocks. Near Llansantffraid Glan Conway. Mochdre. Llansannan. Near Groes, between Denbigh and Llansannan.

Gentiana Amarella L. Trevor Rocks, *Hb. Ruddy.* Eglwyseg Rocks, *T. Ruddy*! Coed Marchon, *J. M. H.*

G. campestris L. Field by Ty Cerrig, Derwen, *J. L. H.* Pastures near Llangollen, *T. Ruddy.* Roadside by top of hill above Graig Fechan, *J. M. H.* Llysfaen Hill. Rhos-y-Domen, between Llansannan and Gwytherin.

Menyanthes trifoliata L. Llyn Dhu, near Llansannan, *Hb. Wood.* Tan-y-Castell, Llangollen, *T. Ruddy.* By Garw Fynydd, Derwen, *J. L. H.* Between Llandegla and Llangollen, *J. M. H.* Near Llyn Syberi. West of Bryn Trillyn. Between Pentre Foelas and Nebo. Between Gwytherin and Llansannan. Near Llyn Serw. Llyn Ddau-ychain. Plas Jolyn, Pentre Foelas. Near Llangwm. Near Blaen-y-cwm, Garn Prys.

Polemonium cœruleum L. Lane near Derwen Station, *J. L. H.* Llangollen, apparently wild, *Drinkwater.* Canal side, Sun Halt, Llangollen, 1906, *Hb. Ruddy.*

Cynoglossum officinale L. Between Llangedwyn and Llanrhaiadr, 1866, *Whitwell.* Quarry near Nantclwyd Station, *J. L. H.* Sun Bank Halt, near Llangollen; Trevor Rocks, *Drinkwater* Below Graig to Tywusog-bach farm, near Llanfair, *J. M. H.* Pen-y-Corddyn Mawr. Llysfaen Rocks. Bank below Groes lwyd farm, near Rhewl.

Symphytum officinale L. Wood above Llysfaen Station, *Thomas.* About Llangollen, *T. Ruddy.* Railway bank near Brymbo, and bank of Pulford Brook, east of Lavister, *F. M. T.*! Roadside between Nant-y-Belan tower and Wynnstay Park, *G. Loftus*! By farm south of Llanfihangel Glyn Myfyr. Below road from Tinker's Brook to Lower Farm, Erbistock.

**Anchusa sempervirens* L. South bank of Dee, Llangollen, *T. Ruddy.* Hilly thicket at Gresford, *Waterfall.* Roadside hedge below the police station at Nantglyn, *Loftus*!

Lycopsis arvensis L. Pwllglas, 2 miles from Eyarth, towards Corwen, *T. Ruddy.* The only inland record (not seen). Between Pensarn and Foryd, *F. M. T.*!

Myosotis scorpioides L. Rhuddlan Marsh, *F. M. T.* Near Derwen, *J. L. H.* Llanrhaiadr-yn-Mochnant, June, 1864, *Hb. Whitwell.* Field below Caer ddinam, Llanelidan; near Glyndyfrdwy; Garth gynan, near Llanfair; by Alyn between Marford and Gresford, *J. M. H.* By mill at Rhyd-y-Foel.—Var. *strigulosa* Reichb. Wood by Pont Llys, Derwen, *J. L. H.* Valley by Llyn Gweryd to Ruthin Road, *J. M. H.*

M. collina Hoffm. Nantglyn Road [from Llansannan], *Hb. Wood.* Llangollen, *T. Ruddy.*

M. versicolor Sm. Voel Fawr, Derwen, and near Clocaenog, School, *J. L. H.* Roadside between Llangollen and Pentre Felin, *J. M. H.* Dinas Brân, 1908, *Hb. Ruddy.*

Lithospermum purpureo-cæruleum L. In quantity, in one station only, which I do not specify.

L. officinale L. Trevor Rocks, 1906, *Hb. Ruddy.* Wood near Denbigh, *J. M. H.* Limestone rocks north of Gallt faenan, *F. M. T.*!

L. arvense L. Eyarth, near Ruthin, 1872, *Hb. Ruddy.*

Echium vulgare L. Trevor Quarry, 1865, *Whitwell.* Trevor Rocks, 1885, *Hb. Ruddy.* Llandyn and Dinbren, near Llangollen, 1865, *Whitwell.* Rhewl, near Ruthin, *J. M. H.*

**Omphalodes verna* Moench. Abundantly in woods about heronry at Pennant Hall, near Eglwys Fach, *W. B. Russell.*

**Amsinckia angustifolia* Lehm. In quantity on farm near Wrexham, 1909, *Drinkwater*; introduced with some Chilian wheat.

Calystegia sepium Br. By Llanddulas Church, with pink flowers, *F. M. T.*! Hedge on high road near Mochdre, *E. H. T.* Old Colwyn and inland of Colwyn Bay, *Ogle.* Llangollen, 1866, *Whitwell.* Llansilin, 1867, *Hb. Jones.* Roadside south of Llanddulas. Llansannan. Near Llanrwst. Near Bettws-y-Coed. By farm near Derwen Hall. By railway close to Llangollen. Llanrhaiadr-yn-Mochnant. Between Llangedwyn and Llansilin. Erbistock.

Convolvulus arvensis L. Between Abergele and Tower Hill, *F. M. T.* Lane from Mochdre Station to high road, *Miss C. I.*

Thomas. Derwen, *J. L. H.* Tal-y-Cafn Station. Shingle near Llanddulas. Embankment at Trevor Station. Trevor. Railway between Rossett and Wrexham.

Atropa Belladonna L. Entered as "ill vouched" in Top. Bot. Gresford, *Southworth.* I was informed in 1911 that some "Belladonna" plants had come up for several years running in a hedge by a wood west of Pentre Felin, near Llansantffraid Glan Conway, but I was unable to find it.

**Datura Stramonium* L. Garden weed at Llanrhaiadr, and amongst potatoes at Brymbo, *Mrs. Evans Jones.*

Hyoscyamus niger L. Field off road from Penrhyn to Mochdre Station, 1902, *Mrs. New.*

Verbascum Thapsus L. Llanelian-yn-Rhos, *F. M. T.* Between Tower Hill and Abergele, *ibid.* Near Valle Crucis Abbey, 1865, *Whitwell*! North of Glyndyfrdwy, *J. M. H.*! Llangollen, *T. Ruddy*! Graig Fechan, *J. L. H.* Near the farm called Garth Gogol below Pen-y-Corddyn Mawr. Cefn-yr-Ogof. Coed Hyrddyn, Llantysilio. Graig-ddu, Rhewl. Railway between Sun Bank and Llangollen. Near Erbistock.

V. Lychnitis L. Several plants at Dinbren, Llangollen, 1911, *T. Ruddy* sp.

**V. nigrum* L. Rubbish-heaps, Brymbo, *T. Ruddy.*

**Linaria Cymbalaria* Mill. Disused quarry in Pen-y-Gardden Wood, *F. M. T.* By Mountain View Hotel, Mochdre, *W. Hodge.* Wall near Bodnant uchaf, Eglwys Fach, *Williams.* Between Ruabon and Pen-y-Cae, Trevor to Llangollen, *J. M. H.* Bersham, near Wrexham, *Drinkwater.* Gell Ifor, north of Ruthin, *J. M. H.* Wall by Lanbedr Rectory, *J. L. H.* Garth-gynan farmyard, east of Llanfair, *J. M. H.* Rhostyllen, *J. Southworth.* Wall of Erbistock Mill, *G. Loftus*! Bettws-yn-Rhos. Llangerniew. Near Bettws-y-Coed. Walls at Rhyd Llanfair. Llanfair Talhaiarn churchyard wall. Pentre Felin, Llangollen. Near Overton Bridge.

L. Elatine Mill. Fields at Llangollen, *T. Ruddy.*

**L. minor* Desf. Railway ballast, Llangollen, *T. Ruddy.*

**Antirrhinum Orontium* L. Queried in Top. Bot. Field by lane leading from Nant-y-Glyn to Bryn Maen, Colwyn Bay, *Hodge.* Among turnips in field between Eglwys Fach Church and Nant.

Scrophularia aquatica L. Holt Meadows, *F. M. T.* Between Trefnant and St. Asaph, *E. H. T.* Pwllglas, near Ruthin, *J. L. H.* Llangollen, *T. Ruddy.* Eyarth, near Ruthin, 1872, *Hb. Ruddy.* Below Eyarth Hall, *J. L. H.* Near Llandyrnog, *J. M. H.* Llwyn On, Wrexham, *T. Ruddy.* By the Alyn, between Marford and Gresford, *J. M. H.*! Conway Valley. Near Glyndyfrdwy. Dee Valley near Erbistock.

S. nodosa L. Near Henllan, *J. M. H.* Derwen, Dinmael, and Llangwm, *J. L. H. & J. M. H.* Efenechtyd and between Clocaenog and Ruthin, *J. M. H.* Llangollen, 1866, *Whitwell.* Road below Eyarth Hall, *J. L. H.* Between Ruabon and Llangollen, *J. M. H.* Roadside near Chirk Station, 1909, *Hb. Waterfall*! Between Llangedwyn and Llanrhaiadr-yn-Mochnant, 1866, *Whitwell.* Llanrwst. Yspytty Ifan. Llwyn On, Wrexham.

***Mimulus moschatus* Dougl. In some quantity along the roadside below Dinas Hill between Bettws-y-Coed and Pentre Foelas, 1911.

***M. Langsdorffii* Donn. Specimens a yard high to left of road between Maerdy and Cerrig-y-Druidion; by Afon Medrad below Llangwm; by Clywedog between Llanrhaiadr and Llandyrnog; near river between Bettws Gwerfil Goch and Maerdy, *J. L. H.* By the Dee at Erbistock, *Loftus.* Roadside, Rhyd lydan, near Pentre Foelas. Along Marddwr, near Pentre Foelas.

Veronica hederæfolia L. Gresford, *E. H. T.* Derwen, *J. L. H.* Llangollen, *T. Ruddy.* Near Denbigh. Abergele. Nantglyn. Chirk. Pentre Saeson. Bwlch Gwyn. Erbistock. Between Marchwiel and Overton. Pont Fadog.

V. didyma Ten. Colwyn Bay, *Hodge.* Llangollen, *T. Ruddy.*

V. Tournefortii C. Gmel. Garden weed at Henblas, Eglwys Fach, *W. E. Williams.* Roadside near Graig, Eglwys Fach, *ibid.* Derwen, *J. L. H.* Near Llandegla, *J. M. H.* Roadside south-east of Abergele. Near Bettws-y-Coed. Cornfield near Llantysilio. Between Marchwiel and Overton.

V. montana L. Wood behind Abergele, *F. M. T.* Nant-y-Plwm, Llansannan, *Hb. Wood.* Glascoed Dingle, Llansannan, *Miss E. F. Jones.* Llangedwyn Wood, 1866, *Hb. Whitwell.* Near Gresford, *E. H. T.* Rhostyllen, *Southworth.* Llwyn On, near Wrexham, *T. Ruddy.* Woods about Erbistock. Woodland in Dee Valley.

V. scutellata L. Derwen neighbourhood, *J. L. H.* Hirwaen, north of Ruthin, *J. M. H.* Llangollen, *T. Ruddy.* Reservoir, Maes Maelor; Oernant; by Pont Lladron, *J. M. H.* Ditches near Llangwstenin. Ditches between road and railway, Mochdre. Plas Jolyn, near Pentre Foelas.

V. Anagallis-aquatica L. Ditch, Pensarn shore, and brick-fields, Pensarn, *F. M. T.*! By Alyn, near Marford, *J. M. H.* Along Pulford Brook, near Lavister, *F. M. T.*! Rhuddlan Marsh.

***Euphrasia nemorosa* H. Mart. (*teste F. Townsend*). Hen fach, Llanrhaiadr-yn-Mochnant, 1864, *Hb. Whitwell.*

Orobanche major L. Bank opposite Bron Derwen, on gorse, and marshy field near Clawdd Newydd, *J. L. H.* Near Llangollen, on footpath to Eglwyseg Rocks, *J. Southworth.*

O. Hederæ Duby. Limestone rocks at Pen Maen, near Old Colwyn, by west end of tunnel.

Lathræa Squamaria L. Bank of Aled, near Llansannan, *Hb. Wood.* Pont-y-Glyn, 1870, *Hb. Ruddy.* On hazel by stream near Clwt Farm, Bodnant, Eglwys Fach, *Williams.* Several places about Llangollen, *T. Ruddy.* Llantysilio, 1900, and Llandyn, Llangollen, 1908, *Hb. Ruddy.* Bank of Nant Tyrel, close to junction with Dee, Erbistock; three clumps parasitic on *Ulmus montana*, *Loftus*!

***Utricularia minor* L. Peat ditches between road and Cefn-y-gadfa. Peat ditches and pools at Plas Jolyn, near Pentre Foelas.

Pinguicula vulgaris L. Bank of Alwen, above Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.* Above Glan Aber, Derwen, *J. L. H.* Hafod bilston, Llandegla, *J. M. H.* Damp ground on

Moelfre-uchaf, *F. M. T.*! North-west of Pentre Foelas. Near Bryn Trillyn. Ceunant. By road between Pentre Foelas and Denbigh. Banks of Conway some distance above Yspytty Ifan. Garn Prys.

Verbena officinalis L. Llandyn, near Llangollen, 1865, *Hb. Whitwell.* Llandyn Farm, Llangollen, 1906, *Hb. Ruddy.* Llanelidan, *J. L. H.* Tan-y-Graig, Graig Fechan, *J. M. H.* Graig, Denbigh. Near Rhewl, near Llangollen.

**Mentha rotundifolia* Huds. By roadside below Llysfaen Rocks (close to a house), *E. H. T.*! By laneside close to Nant Fawr Farm, south of Gwrych Castle.

M. longifolia Huds. Marchwiel, 1906, *T. Ruddy* sp. Old mill, Llwyn On, Wrexham, 1906, *Hb. Ruddy.* — Var. *mollissima* Berk. Colwyn Bay, *Hodge.*—*Var. *nemorosa* Willd. Waste ground by Trefnant Station, *F. M. T.*!

**M. spicata* L. By Medrad below Llangwm; Dinmael, *J. L. H. & J. M. H.* Waste ground, Llangollen, *T. Ruddy.* Old mill, Llwyn On, Wrexham, 1906, *Hb. Ruddy.*

**M. piperita* L. Rhuddlan Marsh, *F. M. T.* Pentre Felin, Llangollen, 1907, *Hb. Ruddy.* Nant-y-Ffrith, *Drinkwater.* Stream south-east of Twll-y-dwr farm, near St. George. By the Conway above Glan Conway. Marshy ground between Fron and Bryn Bod, 2 miles north-east of Bylchau. About the Conway, near Yspytty Ifan. Near Llangwm. By stream flowing into Alwen below Llanfihangel Glyn Myfyr.

M. arvensis L. Between Marford and Gresford, *J. M. H.* Llangollen, *T. Ruddy.* Llangwm, and below bridge at Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.* Near Rhyd-y-Foel.

Lycopus europæus L. Bank of Clwyd, near Llanrhaiadr, *J. M. H.* Llangollen, 1885, *Hb. Ruddy.* Swamp near Llanelidan, *J. L. H.* Bryn Howel, Llangollen, 1909, *T. Ruddy* sp. Between Trevor and Llangollen, *J. M. H.*

Origanum vulgare L. South of Abergele, *F. M. T.*! Quarry by Henllan Church, *Miss C. Ruddy.* Pont-y-Glyn, 1870, *Hb. Ruddy.* North of Glyndyfrdwy; near Dinmael; near Nantclwyd Hall, *J. L. H. & J. M. H.* Llangollen, 1866, *Whitwell*! Graig Fechan, *J. M. H.* Llandegla neighbourhood, *F. M. T.*! Denbigh Castle Hill. Llantysilio.—Var. *albiflorum* Lej. On the shore at Pensarn, *E. H. T.*!

Clinopodium vulgare L. Near Cefn Caves, *F. M. T.* Between Trefnant and St. Asaph, *E. H. T.* Roadside between Llanrhaiadr and Denbigh and near Eyarth, *J. M. H.* Llangollen, *T. Ruddy.* Acrefair to Trevor; roadside beyond gasworks, Nantclwyd; between Llanbedr and Llanfair; and north of Glyndyfrdwy, *J. M. H.*

Calamintha Acinos Clairv. Great Orme, 1896, *Hb. Ruddy.* Cefn-yr-Ogof.

C. montana Lam. Hill going up from Llanrhaiadr just before reaching the North Wales Asylum, *J. M. H.* Roadside between Llanfair Dyffryn Clwyd and Ruthin, *J. L. H.* Quarry opposite Llandrillo-yn-Rhos Church, *Hodge.* Near Esgyryn.

**Melissa officinalis* L. Bryn Melyn, Trevor Rocks, 1908, *Hb. Ruddy.* Near Pen-y-graig, near Nantclwyd, *J. L. H.*

Nepeta Cataria L. Trevor Rocks, 1881, *Hb. Ruddy.* Foot of limestone rocks south of Llysfaen; north-west of Llantysilio.

Scutellaria galericulata L. Ty Coch Farm, Llanynys, near Llanrhaiadr Station, *Miss H. M. Williams.* Canal side between Cysyllte and Chirk, 1865, *Hb. Whitwell.* Llantysilio Bog, *T. Ruddy.* Near Llanelidan, *J. L. H.* By stream east of Pentre Foelas.

S. minor Huds. Near Cambwll, Derwen; near Nant-y-Garth; above Gwndir, near Llanelidan, *J. L. H. & J. M. H.* Near Llyn Syberi. Between Bryn Trillyn and Gwytherin.

**Melittis Melissophyllum* L. Pentre Felin, Llangollen, 1908, *Hb. Ruddy.*

Marrubium vulgare L. Near top of Llysfaen village, *E. H. T.*! On limestone, Eyarth Rocks, *J. L. H.* Near Garth Gogol farm, below Pen-y-Corddyn Mawr, near Rhyd-y-Foel.

Stachys arvensis L. Near Pont Newydd, *F. M. T.* Ffordd Ty Celyn, near Llanelidan, *J. M. H.* Near Eglwyseg Rocks, 1865, *Whitwell.* Ruabon to Pen-y-Cae, *J. M. H.* Llangollen, *T. Ruddy.* Above Coed Ial Farm, Glyndyfrdwy, *J. M. H.* Between Eglwys Fach Church and Nant. Llanddulas.

[*Galeopsis Ladanum* L. The record for this plant which I gave in Journ. Bot. 1911 (Suppl. I., p. 39) cannot stand; Miss Jones's plant is *G. angustifolia* Ehrh. Mr. J. M. Harnaman tells me that he found *G. Ladanum* on railway bank at Gresford in 1905, and also between Trevor and Llangollen in 1912; I have seen no specimens.]

G. speciosa Mill. Roadside, near Llangedwyn, 1865, *Whitwell.* Field above Trevor Hall, Llangollen, 1875, *Hb. Whitwell.* Near Eglwyseg Rocks, 1865, *W. Whitwell.* Field near Foel Bach, Derwen, *J. L. H.* Close to Cefn-ffordd above Dafarn dwyrch, near Llandegla; field by Cefn Mawr, Derwen; Cefn-y-wern, towards Corwen from Llanelidan, *J. L. H. & J. M. H.*

**Leonurus Cardiaca* L. Timber-yard, Pensarn, *F. M. T.* Quarry behind entrance of Gwrych Castle, *Miss C. Ruddy.* Lane, Ty Garth-isaf, Moelfre, *F. M. T.* Llangollen, *Dr. H. Drinkwater.*

**Lamium amplexicaule* L. Hedgebank, Ysgubor-ucha, Llanelidan, 1912, *J. L. H.*

**L. hybridum* Vill. Near top of Lysfaen Village, *Dr. F. D. Thomas & E. H. T.* Near Llandudno Junction. Nursery garden, Llansantffraid Glan Conway. Garden weed, Llanrhaiadr-yn-Mochnant. Waste ground, Wrexham.

**L. maculatum* L. Near Abergrugoer, Eglwys Fach, *W. E. Williams.* Near Bron Derwen, Derwen; by Bryn Ffynnon, Clawdd Newydd; roadside, Tybrith, Llanelidan, 1912, *J. L. H.* Bank of narrow lane leading from Llandegla Church to the river, *F. M. T.* !

L. album L. Gresford, *F. M. T.* Llangollen, *T. Ruddy.* Near Abergrugoer, Eglwys Fach, *W. E. Williams.* Close to Holt Bridge, 1911, *F. M. T.* Field near Rhewl Station, *J. L. H.* Waste ground at Wrexham. About Erbistock Mill. Eyton. Road between Overton Bridge and Marchwiel.

L. Galeobdolon Crantz. Near Hendre Aled, Llansannan, *Hb. Wood.* Side of stream by Offa's Dyke, near Ruabon, *F. M. T.* Canal side, Llangollen, *Hb. Ruddy.* Crevices of Eisteddfod Rocks, *F. M. T.*! Eglwys Fach. Wood near Llandegla. Eyarth. Woods in Dee Valley.

Ballota nigra L. Holt, *F. M. T.* Valle Crucis Abbey and Trevor Rocks, *T. Ruddy.* Between Abergele and Tower Hill, *F. M. T.* Gogarth Abbey, 1896, *Hb. Ruddy.* Cefn Rocks, *J. M. H.* Near Plas-yn-Ward, Rhewl, *J. L. H.* Denbigh Castle Hill. Near Erbistock.

Plantago media L. Roadside between Denbigh and Henllan; Pen-llain-wen, between Llandegla and Ruthin, *J. M. H.*! Llanarmon. Pen-y-Corddyn Mawr.

P. lanceolata L. var. **sphærostachya* Roehl. Eyarth Rocks, *J. L. H.* Eisteddfod Rocks, *F. M. T.*! Pen-y-Corddyn Mawr. Eglwyseg Rocks.

Littorella uniflora Aschers. Llyn Syberi. Llyn Aled. Llyn Alwen. Llyn-y-Foel Frech. Llyn Ddau-ychain.

Scleranthus annuus L. Pen-y-Bryn, near Llangollen, *T. Ruddy.* Roadside, Ffrith Agored, Clocaenog, and field behind Derwen Rectory, *J. L. H.* Field between Eglwys Fach and Llyn Syberi.

**Chenopodium Bonus-Henricus* L. Abergele, *Miss C. Ruddy.* Mill on Aled, near Llansannan, *Hb. Wood.* Derwen district; Bettws Gwerfil Goch; Efenechtyd; near Plas Einion, Llanfair, *J. L. H. & J. M. H.* Near Eglwyseg Rocks, *Southworth.* Near Pontstyllod, near Llandegla, and near Lletty-llygoden, between Llandegla and Bwlch Gwyn, *J. M. H.* Near Pentre Foelas. About old cottage near Groes, Denbigh. Between Bryn-yr-Esgob and Ty'n-y-mynydd, near Nebo. Cerrig-y-Druidion. Yspytty Ifan. Llangwm. Nantglyn.

Atriplex littoralis L. Between Llandudno Junction and Deganwy, *J. M. H.*!

**A. Babingtonii* Woods. Near Colwyn Bay.

Salicornia europæa L. Salt marsh along Conway estuary, *F. M. T.*!

**Polygonum Raii* Bab. Waste ground, Marine Drive, Llandudno, 1908, *Hb. Waterfall*!

P. Bistorta L. Llangollen, *Drinkwater.* Field by Cae Gwilym, Derwen, and field, Llanelidan, *J. L. H.* By roadside near Llandegla, *F. M. T.*! Path by Dee, above Erbistock. A patch in lane between Nant-y-Belan Tower and Belan Place.

**Fagopyrum sagittatum* Gilib. Holt, *F. M. T.* Llangollen, *T. Ruddy* sp.

Rumex sanguineus L. β *viridis* Sibth. Llangollen, *Hb. Ruddy.*

**R. pulcher* L. Hayfield near County School, Llangollen, 1909, casual, *Hb. Ruddy.*

R. Hydrolapathum Huds. Ditches between Pensarn and Towyn, *F. M. T.*!

**Daphne Laureola* L. About a hundred bushes in one place near Gresford, *F. M. T.* Maes Mynan Wood, near Caerwys, *Mrs. New*! Castell Fawr Wood, behind Abergele, *E. H. T.* Llwyn-ucha, Derwen, *J. L. H.* Woodland and limestone copse by Elwy below Pont-y-Trap, and along the laneside north of Plas Heaton, *F. M. T.* Woodland by Lady Bagot's Drive, *J. L. H.* Bron Henlog, Llangollen, 1906, *Hb. Ruddy.* Roadside below Pen-ucha'r Green, near Trefnant.

Viscum album L. Rhosnesney, on apple, *Dr. H. Drinkwater.*

**Euphorbia Cyparissias* L. Plentiful on railway embankment, Ruabon, some years ago; not found in 1911, *T. Ruddy.*

E. exigua L. Quarry near Tyddyn Ucha, inland of Abergele, *F. M. T.* Chirk, *T. Ruddy.* Llangollen, *Hb. Ruddy.* Between railway and shore, Llanddulas.

**Buxus sempervirens* L. Afon Meirchion, near Henllan, well established, *J. M. H.*

Humulus Lupulus L. Between Llandebr and Llanfair; hedge between Rectory and Pont-y-Maes, Llanelidan; by Gwegil-y-Bryn, Llanelidan, *J. L. H.* Field hedge a little east of Llysfaen. Towards Bettws-y-Coed, from Llanrwst. Llangollen. Near Rhyd-onen, east of Glyn Dyfrdwy.

Parietaria ramiflora Moench. Wall, Llanelidan, and between Llanbedr and Llanfair, *J. L. H.* Stone embankment of the Conway estuary, *F. M. T.*! Esgyryn. Wall between Pensarn and Foryd. Denbigh Castle.

Carpinus Betulus L. A few trees at Llangollen, *T. Ruddy.* Between Llansantffraid Glan Conway and Pentre Felin. Between Tal-y-Cafn and Llanrwst. Near Maes Gwyn, Pentre Foelas. A large tree in hedgerow, ½ mile from Segrwyd, towards Denbigh. Woodland by river at Rhewl. Hedge between Erbistock Ferry and Overton Bridge. North side of Wynnstay Park.

**Salix pentandra* L. Close to road below Bryn-yr-Esgob, near Nebo. West of Pant-y-griafolen, near Glasfryn.

S. fragilis L. Llangollen, *T. Ruddy.* Yspytty Ifan.

**S. purpurea* L. Llangollen, *Hb. Ruddy.* By Dee, near Llangollen.

S. repens L. Rhos-y-Domen, north of two tumuli between Gwytherin and Llansannan.

**Populus alba* L. Wrexham, *Hb. Ruddy.* Near Nebo and Pentre Foelas, perhaps planted.

P. tremula L. Eglwyseg Rocks, *T. Ruddy.* Between Graig and Llansantffraid Glan Conway. Conway Valley between Tal-y-Cafn and Llanrwst. Hill west of Groes, towards Llansannan. Pentre Foelas. Near Nebo. Between Gwytherin and Llansannan. Below Ty'n-y-coed above Yspytty Ifan. Near the Conway below Fedw, east of Llyn Conway.

**P. nigra* L. Llangollen, *T. Ruddy.* Conway Valley. Three trees (planted), at 1200 ft., at Moelfryn Serw, near source of Conway. Near Wrexham.

Empetrum nigrum L. Gyrn Moelfre, near Llansilin, *Hb. Jones.* Bank of Clwyd below Foel Grachen, Derwen, *J. L. H.* World's End, Llangollen, 1865, *Hb. Whitwell.* Llyn-y-Chwiaid, 2 miles from Llandegla, *J. M. H.* Moel Garegog, *F. M. T.*! Near Llyn Syberi. Between road and Cefn-y-gadfa, north-west of Pentre Foelas. Above Yspytty Ifan. Llantysilio Mountain.

Taxus baccata L. Nant-y-Belan, *Loftus*! Limestone cliff below the tower, Cefn-yr-Ogof, between Abergele and Llanddulas. Near summit of limestone cliffs on the S.W. side of Pen-y-Corddyn Mawr, growing vertically against the rock, having a curious flattened aspect owing to the prevailing westerly winds. About Bryn, between Erbistock and Ruabon. Steep limestone rocks in Nant-y-Ffrith.

Elodea canadensis Michx. In the Alyn between Marford and Gresford, *J. M. H.* Seen in Aled at its source; doubtless occurs in the lake: altitude about 1220 ft.

Neottia Nidus-avis Rich. Southern portion of Wynnstay Park, *R. Brown.*

Listera ovata Br. Hendre Aled, Llansannan, *Hb. Wood.* Derwen, *J. L. H.* Pool Park, near Ruthin, *R. Brown.* Carreg-yr-alltydd, Llandegla, *J. M. H.* Ty'n-y-Coed, Derwen, *J. L. H.* Roadside, 2 miles from Denbigh, towards Bylchau. Roadside between Nantglyn and Denbigh. Dingle below Hafod-y-cefn Plas-onn, towards Nantglyn.

Helleborine latifolia Druce. Gresford, *F. M. T.* By road to Pwll-y-Crochan from Llandrillo-yn-Rhos, *Mrs. New.* Behind Abergele, and lane ascending towards Moelfre uchaf from Bettws-yn-Rhos, *E. H. T.*! Llangollen and Wrexham, *T. Ruddy.* Between Denbigh and Nantglyn.

**H. atrorubens* Druce. Limestone crevices on Eisteddfod Rocks, *F. M. T.*!

Orchis pyramidalis L. Trevor Rocks, *Hb. Ruddy.* Below Eglwyseg Rocks, 1866, *Hb. Whitwell.*

O. morio L. Meadow near Llansannan, *Hb. Wood.* Marshy ground below Ty'n ffordd, Derwen, *J. L. H.* Near Wrexham, *Drinkwater.* Llwyn On old mill, Wrexham, 1906, *Hb. Ruddy.* Eyarth Woods, *J. L. H.*

O. latifolia L. Marsh near Llansannan, *Hb. Wood.* Near Llangollen, *T. Ruddy.* Carreg-yr-alltydd, Llandegla, *J. M. H.* Marshy ground near Garth-y-Groes, Llanelidan, *J. L. H.*

Habenaria conopsea Benth. Near lime works, Minera, with the following, *T. Ruddy.*

H. viridis Br. Derwen; and road above Bryn ffynnon, near Nantclwyd Hall, *J. L. H.*

H. bifolia Br. Near Snipe Pond, Llansannan, *Hb. Wood.* Wood by Ty'n-y-ffrith, Derwen, 1912, *J. L. H.* Llangollen, *Drinkwater.* Near Bryn Ffynnon, Clawdd Newydd, and near Nantclwyd Hall, *J. L. H.* Court field bordering on the Tyno, Llandegla, 1892, *J. M. H.*

**H. virescens* Druce. Near Snipe Poel, Llansannan, *Hb. Wood.* Wood near the Clwyd, Derwen, *J. L. H.*

Iris fœtidissima L. I noticed a quantity, in January, 1913, growing about a cottage called Tan-y-Bryn north of road about halfway between Henllan and Llannefydd. The inmates informed me that they had brought the plant with them from Henllan, where the plants had been originally found wild twenty years previously: this affords indirect confirmation of Griffith's old record (Bot. Guide, p. 167), "Woods and hedges about the farmhouse of Pen ucha'r Green, in the parish of Henllan."

Narcissus Pseudo-Narcissus L. Woodland by Rhysgog, west of Llantysilio, *F. M. T.* Field adjoining Plas Lelo, Derwen, *J. L. H.* Meadow west of railway near Gresford, *F. M. T.* sp. Bryn Ffynnon Woods, Llanelidan, *J. L. H.* Near Pennant, Eglwys Fach. Woods by Dee at Erbistock.

**Galanthus nivalis* L. Field on Pentre Farm, Derwen, *J. L. H.* Woods at Marl Hall.

Tamus communis L. Llanddulas, *F. M. T.* Between Trefnant and St. Asaph and near Mochdre, *Miss C. I. Thomas.* Pont Newydd and Nantglyn; inland of Abergele, *F. M. T.* Derwen, *J. L. H.* Common at Llangollen, *T. Ruddy.* Graigfechan and Llanbedr, *J. M. H.* Ruabon to Pen-y-Cae; Acrefair to Trevor; above Coch Ial Farm, Glyndyfrdwy, *J. M. H.* Eyarth.

**Ruscus aculeatus* L. Hedge near old house, Nant-y-Gollen, Eglwys Fach, *Williams.* Hedgerow by roadside below Cae Forys, near Eglwys Fach.

**Polygonatum multiflorum* All. Cae Boncyn, Comyns, Derwen, *J. L. H.*

**Allium vineale* L. *β compactum* Thuill. Tower Farm, Llangollen, 1907, *Hb. Ruddy.*

Narthecium Ossifragum Huds. Bog near Spring Hill, *Miss E. F. Jones.* Llyn Du, near Llansannan, *Hb. Wood.* Bank of Alwen above Llanfihangel Glyn Myfyr; Llyn-y-Chwiaid, 2 miles from Llandegla; Valley below Llyn Gweryd; bog above Gwndir, near Llanelidan; and Cefn ffordd, near Llandegla, *J. M. H.* Moelfre uchaf, *F. M. T.*! By Llyn Syberi. Between Pentre Foelas and Nebo. Near Bryn Trillyn. Ceunant. Moorland near Llyn Aled and Llyn Alwen. Near Yspytty Ifan. Garn Prys. Near Plas Jolyn, Pentre Foelas. Llyn Serw.

Paris quadrifolia L. Fox Hall Wood, near Denbigh, *J. M. H.* Wilderness at Gresford, *Drinkwater.*

Juncus Gerardi Lois. Conway estuary, *F. M. T.*!

J. maritimus Lam. Along Conway estuary, extending for some distance above Tal-y-Cafn.

J. sylvaticus Reich. Bog below "Whalley's Folly" tower, near Trevor, 1875, *Hb. Whitwell.* Carreg-yr-Alltydd, Llandegla, *J. M. H.* Pistyll Rhaiadr, 1875, *Hb. Whitwell*! Near Pentre Foelas. Llyn Aled. Llyn Serw. Near Yspytty Ifan.

Luzula pilosa Willd. Nant-y-Growen, Llansannan, *Hb. Wood.* Pont-y-Glyn, 1870, *Hb. Ruddy.* Gresford Woods, *Southworth.* Llangollen, *T. Ruddy.* Wood below Gallt-y-Celyn, Derwen, *J. L. H.* Nantglyn. Near Erbistock.

L. sylvatica Gand. Afon Meirchion, near Henllan, *J. M. H.* River bank near Bettws Gwerfil Goch and wood above Ty Newydd, Nantclwyd, *J. L. H.* Ceunant. Woods in Dee Valley.

Typha latifolia L. Pond between Holt and Wrexham, *F. M. T.*

Gwersyllt, *Dr. H. Drinkwater.* Near Pulford Brook, between Lavister and the Dee, *F. M. T.*!

**Sparganium neglectum* Beeby. By Alyn between Marford and Gresford and stream near Nantclwyd Station and near Bodidris, *J. M. H.* Ditches near Llangwstenin. Conway Valley. Valley between Pentre Foelas and Cerrig-y-Druidion. River below Llanfihangel Glyn Myfyr. Llandegla neighbourhood.

S. simplex Huds. River below Llangwm, *J. L. H. & J. M. H.* Canal, Llangollen, *T. Ruddy.* Reservoir, Maes Maelor, and by Alyn between Marford and Gresford, *J. M. H.*

Lemna trisulca L. Pond near Dinorben, St. George, with the next; ditches about Abergele and Pensarn, *F. M. T.*

L. minor L. Llanfair Talhaiarn, *F. M. T. & E. H. T.* Gresford, *T. Ruddy.* Near Lavister, *F. M. T.*! Near Llansannan.

**L. gibba* L. Ditch in lane leading to shore, close to Towyn Church, *F. M. T.*!

L. polyrrhiza L. Water Soldier Pond near Gresford, July, 1909, *Hb. Ruddy.*

Sagittaria sagittifolia L. Pulford Brook, beginning about a mile below Pulford and extending for some distance, *F. M. T.*!

Triglochin palustre L. Field by shore at Pensarn, *F. M. T.* Llyn-y-Fawnog, *Dr. W. B. Russell.* Field between Clawdd Newydd and Comyns, and field opposite 'Sun Inn,' Derwen, *J. L. H.* Gresford, *Drinkwater.* Lane from Llangwm Church to Pont-y-Glyn, and field, Coed Llys, Llandegla, *J. M. H.* Damp ground on Cyrn-y-Brain, *F. M. T.*! Conway Estuary, with the next.

T. maritimum L. Salt marsh, Llandrillo-yn-Rhos, *Dr. W. B. Russell.*

Potamogeton polygonifolius Pourr. Moorland pastures above Colwyn Bay, *Hb. Waterfall.* Bog above Gwndir, Llanelidan, and Reservoir, Maes Maelor, *J. M. H.* Near Llyn Syberi. Near Yspytty Ifan.

P. lucens L. Canal at Llangollen, *T. Ruddy.*

**P. prælongus* Wulf. Canal at Llangollen, *T. Ruddy*, with **P. perfoliatus* L. Llyn Aled. Llyn Alwen.

P. crispus L. Pond near Dinorben, near St. George, *F. M. T.* Chirk Fish Hatcheries, 1909, *Hb. Waterfall.* Alyn between Marford and Gresford, *J. M. H.*

P. pusillus L. Canal, Llangollen, *T. Ruddy.* By engineering works at Acrefair, *J. M. H.* Pool in Conway Valley, close to river above Tal-y-Cafn.

**P. pectinatus* L. Pond by the Conway above Eglwys Fach. Alyn, near Gresford.

**Ruppia rostellata* Koch. Pond by brickfields, south of Llandudno Junction, *F. M. T.*!

Scirpus fluitans L. Moorland pastures above Colwyn Bay, *Hb. Waterfall.*

S. setaceus L. Snipe Pond, Llansannan, *Hb. Wood.*

**S. Tabernæmontani* Gmel. Ditch south of Llandudno Junction, *F. M. T.*!

S. maritimus L. Conway Estuary, extending almost to Trefriw.

Carex pulicaris L. Pistyll Rhaiadr, 1875, *Hb. Whitwell.* Damp ground about limestone crags of Great Orme, 1900, *Hb. Waterfall.* By old road from Llandegla to Bwlch Gwyn, *J. M. H.* Lane near Tyn-y-Ffrith, Derwen, *J. L. H.* Between Llangollen and Llandegla, *J. M. H.* Near Tyddyn Felin, Derwen, *J. L. H.* Near falls at Rhaiadr Fawr. By the Afon Serw. Swampy ground, Garn Prys.

**C. disticha* Huds. Gorge of Afon Serw.

C. arenaria L. Interstices of stone embankment near Llansantffraid Glan Conway, *F. M. T.*!

C. paniculata L. By Ffynnon Sarah, Derwen, *J. L. H.* Swamp near Llyn Alwen.

C. vulpina L. Marshy ground near Rhôs Point, *Dr. W. B. Russell.* Ditches and marshy places south of Llandudno Junction, *F. M. T.*! Pensarn. Abergele. Towyn. Near Mochdre. Ditches between Abergele and Rhuddlan. Conway Estuary. Gresford.

C. contigua Hoppe. Near Cefn Byr, Llansannan, *Hb. Wood.* Roadside, Derwen, *J. L. H.* Near the Conway, S.W. of Eglwys Fach. Near Llantysilio. Rhewl, near Llangollen.

C. curta Good. Swampy ground S.E. of Maes Maelor, between Llandegla and Bwlch Gwyn, close to Brymbo waterworks, and Moel Garegog, *F. M. T.*!

C. leporina L. Gresford, *Hb. Potts.* Ty'n-y-coed, 1868 (teste *A. Bennett*), *Hb. Jones.* Pool, Clawdd Newydd, *J. L. H.* Old road to Bwlch Gwyn from Llandegla, *J. M. H.*

C. pilulifera L. Moorland pastures above Colwyn Bay, *Hb. Waterfall.* Foel Fawr, Derwen, *J. L. H.*

C. pallescens L. Pistyll Rhaiadr, 1875, *Hb. Whitwell.* Field near Nant Morfydd, Derwen, and field at top of lane leading to Ty'n-y-coed, Derwen, *J. L. H.* Rocks at Rhaiadr Fawr.

C. pendula Huds. Woodland along the Conway. Wynnstay Park. Erbistock.

C. sylvatica Huds. Pont-y-mwynwr, Llanferres, *Hb. Potts.* Rhostyllen, *Southworth.* Gresford.

C. distans L. Bank of Alwen near vicarage at Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.*

C. flava L. Small pool by "Whalley's Folly," near Trevor Hall, Llangollen, 1875, *Hb. Whitwell* (*β lepidocarpa*). Bank of Alwen at Llanfihangel Glyn Myfyr; Pont-y-Glyn Diffwys; swamp near Llanelidan, *J. L. H. & J. M. H.* Damp ground on Moelfre uchaf. By the Afon Serw. Near Llyn Serw.

C. hirta L. Near Tyno at Llandegla, *J. M. H.* Near Clocaenog, *J. L. H.* Swamp at Coed Llys, Derwen, *J. M. H.* Near Abergele.

C. riparia Curt. Near Pulford, *J. Southworth.*

C. inflata Huds. Left bank of river below Llanfihangel Glyn Myfyr, *J. L. H. & J. M. H.* By Lake Fawnog, near Colwyn, 1906, *Hb. Waterfall* (a narrow leaved state). Reservoir at Maes Maelor, *J. M. H.* Swampy ground, Garth-y-Groes, Llanelidan, *J. L. H.* sp. Marsh in Plas Newydd field, Llandegla, *J. M. H.* Near Llyn Syberi. Llyn Creiniog. The dominant plant at Llyn-y-Foel Frech.

Llyn Serw. Llyn Ddau ychain. Bog S.W. of Plas Jolyn, Pentre Foelas.

Melium effusum L. Rhostyllen, *J. Southworth.*

Aira caryophyllea L. Llangollen neighbourhood, *T. Ruddy.* Moel Garegog, *F. M. T.*! Near Pentre Foelas. About Cerrig-y-Druidion.

A. præcox L. The Gyrn, Llansilin, 1869, *Hb. Jones.* Near Bettws-y-Coed. Pentre Foelas.

Trisetum flavescens Beauv. Trevor Rocks, 1881, *Hb. Ruddy.* Llangollen, *T. Ruddy.* Llandegla, and Ruabon to Pen-y-Cae, *J. M. H.*! Meadows skirting Pulford Brook, *F. M. T.*!

Avena pubescens Huds. Eisteddfod Rocks, Minera, *F. M. T.*! Old quarry near Esgyryn.

Kœleria gracilis Pers. Pen-y-Corddyn Mawr.

Melica nutans L. (=*M. uniflora* Retz). Pont Newydd, *F. M. T.* Nant-y-Growen, Llansannan, *Hb. Wood.* Inland of Abergele, *F. M. T.* Ruabon to Pen-y-Cae, *J. M. H.* By Bryn Ffynnon, Llanelidan, *J. L. H.* Rocks by the Ceiriog, Llansantffraid Glyn Ceiriog, 1866, *Hb. Whitwell.* Pen-y-Gardden Wood, near Ruabon, *E. H. T.* Llandegla, *F. M. T.*! Tower Hill, Abergele. Near Rhaiadr Fawr. Gorge of Conway above Yspytty Ifan.

Briza media L. Near Pont Newydd, *F. M. T.* Llandegla, *J. M. H.* Eisteddfod Rocks, and roadside S.W. of Bwlch Gwyn, *F. M. T.*! Between Denbigh and Bylchau. Between Nantglyn and Denbigh. Marford.

Glyceria fluitans Br. Pool below "Whalley's Folly," Trevor, 1875, *Hb. Whitwell.* Llangollen, *T. Ruddy.* Llandegla, *J. M. H.*

G. maritima Mert. & Koch. Conway Estuary, *F. M. T.*!

Festuca rigida Kunth. Denbigh Castle.

Bromus sterilis L. Seashore, Colwyn Bay, *Dr. W. B. Russell.* Llangollen, 1906, *Hb. Ruddy.* Road from Llangollen towards Llandegla, *J. M. H.* By the railway between Llandudno Junction and Llansantffraid Glan Conway, *F. M. T.*! Roadside 1½ miles from Denbigh, towards Bylchau. Erbistock.

Agropyrum junceum Beauv. Railway embankment at Old Colwyn.

Hordeum nodosum L. Meadows skirting Pulford Brook, between Lavister and the Dee, *F. M. T.*!

H. murinum L. Side of canal at Llangollen, 1906, *Hb. Ruddy.* Llandudno Junction, *F. M. T.*! Denbigh Castle Hill; Colwyn Bay.

**Hymenophyllum peltatum* Desv. Dripping rocks in gorge of Conway, 3 miles above Yspytty Ifan. Only seen on the Denbighshire side. Rocks by the Afon Serw, just above its junction with the Conway.

Cryptogramme crispa Br. Wall 1 mile south of Pont Moelfre.

Asplenium Adiantum-nigrum L. Holt Castle Rock, 1912, *F. M. T.* sp. Walls beyond Llanrhaiadr-yn-Mochnant, on road to Pistyll Rhaiadr, 1862, *Hb. Whitwell.* Nant-y-Plwm, *Hb. Wood.* Llangollen, *T. Ruddy.* Rocky gorge on Geraint Hill, Llangollen, 1864, *Hb. Whitwell.* Pentre Felin, Llangollen, *J. M. H.* Crag of volcanic ash near Llechryddan, Oswestry, 1864, *Hb. Whitwell.* Ceunant. Pentre Foelas. Near Bettws-y-Coed. Walls between Bettws-y-Coed and Pentre Foelas.

**A. viride* Huds. Very plentiful on rocks in one station in the Llansannan area. Also occurs near Llangollen.

A. Trichomanes L. Mill near the Aled, Llansannan, *Hb. Wood*! Valley of the Iwrch, near Llanrhaiadr-yn-Mochnant, 1864, *Hb. Whitwell*! Black Dingle, Colwyn Bay, *Dr. W. B. Russell.* World's End, Eglwyseg Rocks, 1868, *Hb. Whitwell.* On bridge and walls by Cymro Inn at Maerdy; Graig fechan; and Pont-y-Glyn Diffwys, *J. L. H. & J. M. H.* Ceunant. Near Bettws-y-Coed. Nant Mawr, 5 miles east of Gwytherin.

A. Ruta-muraria L. Bryn, near Llansannan, *Hb. Wood.* World's End, Eglwyseg Rocks, 1865, *Hb. Whitwell.* Walls, Colwyn Bay, *Dr. W. B. Russell.* Rhostyllen, *J. Southworth.* Llangollen, *T. Ruddy.*

Ceterach officinarum Willd. I am informed that this formerly grew on a wall between Llandudno Junction and Mochdre, but was exterminated by collectors. Neighbourhood of Bettws-y-Coed, Eglwys Fach and Llangollen and in three other localities.

Phyllitis Scolopendrium Newm. Eyarth Bridge, Ruthin, 1872, *Hb. Ruddy.* Coppy Woods, Llanelidan, 1912, *J. L. H.* Gorge below bridge at Pont-y-Glyn Diffwys, *J. L. H. & J. M. H.* Coed Marchon, Pwllglas, *J. L. H.* Black Dingle, Colwyn Bay, *Dr. W. B. Russell.* Dingles about Eglwys Fach. Ceunant. Bettws-y-Coed neighbourhood. Gorge of Conway above Yspytty Ifan. Gorge of Afon Serw. Near Dee above Erbistock.

Cystopteris fragilis Bernh. Rhaiadr Fawr, *Hb. Wood*! Gorge east of the Geraint, Llangollen, 1864, and World's End, 1868, *Hb. Whitwell.* Above Pant-y-ffordd isa, near Llandegla, *J. M. H.* Pistyll Rhaiadr, 1864, *Hb. Whitwell* (type and *β dentata*). The Berwyns, 1872, 1901, *Hb. Ruddy, T. Ruddy.* Rocks near Conway Falls. Ceunant. Gorge of Conway above Yspytty Ifan.

Lastræa montana T. Moore. Nant-y-Growen, near Llansannan, *Hb. Wood.* Valley below Llyn Gweryd, *J. M. H.* Wood beyond Meiarth Mill, Derwen, *J. L. H.* Llangollen neighbourhood, *T. Ruddy.* Road crossing River Concwest between Cyffylliog and Nantglyn, *J. M. H.* The Geraint, Llangollen, 1864, *Hb. Whitwell.* Nant-yr-hendre, Llanelidan, and between Llandegla and Llanelidan, *J. M. H.* Ceunant. Moel Unben, near Llansannan.

L. rigida Presl. In one inland station on limestone.

Phegopteris Dryopteris Fée. The Geraint, 1864. Very abundant in gorge on south side, *Hb. Whitwell.* Nant-y-Plwm, near Llansannan, *Hb. Wood.* Wood below Gallt-y-Celyn, Derwen, *J. L. H.* Black Dingle, Colwyn Bay, *Dr. W. B. Russell.* Along gorge of river at Pont-y-Glyn Diffwys, *J. L. H. & J. M. H.* Very fine and luxuriant in the dingle one mile west of Nantglyn. Rocks by the Conway just below the gorge, nearly 3 miles above Yspytty Ifan.

P. polypodioides Fée. Base of the Pistyll Rhaiadr, Denbighshire side, 1864, *Hb. Whitwell.* Nant-y-Plwm, Llansannan, *Hb.*

Wood. Ceunant; very plentiful and fine in shady crevices of rocks, extending up to Rhaiadr Fawr. Near Conway Falls. By the Conway near Foelas Hall. Gorge of Conway, 3 miles above Yspytty Ifan. Gorge of Afon Serw. Nant Llan Gwrach, near Yspytty Ifan. Rather sparingly on rocks by waterfall just above Yspytty Ifan.

Osmunda regalis L. Llangollen neighbourhood, only two plants seen, *T. Ruddy.* Near Llanelidan, *J. L. H. & J. M. H.*

Ophioglossum vulgatum L. Field by roadside between Colwyn Bay and Llanrwst, *Dr. W. B. Russell.* Near Llangollen, *T. Ruddy.*

Botrychium Lunaria Sw. Moors near Hendre Aled, Llansannan, *Hb. Wood.* Llangollen, *T. Ruddy.* A single specimen on Llanrwst Road from Colwyn Bay, seen some years ago, *Dr. W. B. Russell.*

Equisetum maximum Lam. Hendre Aled, *Hb. Wood.* Valley of the Iwrch, near Llanrhaiadr-yn-Mochnant, 1864, *Hb. Whitwell.* Trevor Rocks, 1908, and by the mill below Henllan, *J. M. H.* Llwyn On Mill, Wrexham, 1906, *Hb. Ruddy.* Conway Valley. Near Derwen. Near Llangollen. Woodland near Lower Farm, Erbistock.

E. sylvaticum L. Near Cefn Byr, Llansannan, *Hb. Wood.* Stream above the inn at Llangwm, and brookside near Llanbedr, *J. L. H. & J. M. H.* Roadside about 2 miles west of Groes, near Denbigh. Roadside between Groes and Bylchau. Ceunant. Roadside outside Gwytherin. In the valley almost north of Gorsedd Bran. Conway Valley above Yspytty Ifan, both in Denbigh and Carnarvon. Nant-y-Ffrith,

E. limosum L. By Ffynnon Sarah, Derwen, 1912, *J. L. H.* Near Llangollen, *T. Ruddy.* Llyn-y-Foel Frech, in quantity.

Lycopodium Selago L. World's End, Eglwysegle Rocks, 1865, *Hb. Whitwell.* Sparingly on rocks at Rhaiadr Fawr and along Ceunant. North ascent of Garn Prys, especially on swampy ground. Gorge of Conway above Yspytty Ifan. Gorge of Afon Serw.

L. clavatum L. Pen-y-Gwely, *Miss E. F. Jones.* Moors near Llyn Aled, *Hb. Wood*! Slope of Moel-y-Faen, near Llangollen, and World's End, Eglwysegle Rocks, 1865, *Hb. Whitwell*; and 1907, *Hb. Ruddy.* Near the flagstaff beyond "Whalley's Folly," on the hill near Trevor Hall, 1875, *Hb. Whitwell.* Mr. Rowlands of Pensarn, Abergele, informs me that he has seen this species on Moelfre Uchaf. Moel Grugoer, near Bylchau.

L. alpinum L. World's End, Llangollen, 1865, *Hb. Whitwell.* Sparingly on Moel Bengam, north-east of Llyn Aled.

**Selaginella selaginoides* Gray. Wet banks of Ceunant below Rhaiadr Fawr. By Conway, 3 miles above Yspytty Ifan. Gorge of Afon Serw. By the Afon Serw, near Trewyn Swch.

Isœtes lacustris L. Llyn Alwen.

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